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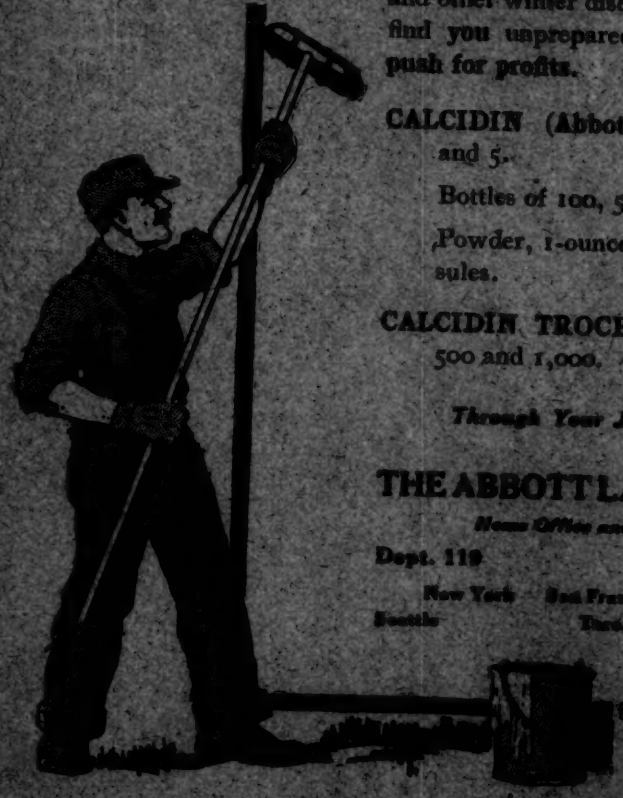

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THE AMERICAN
JOURNAL OF PHARMACY

OCTOBER, 1919

EDITORIAL.

PHARMACEUTICAL RESEARCH.

The following announcement has been issued by the American Drug Manufacturers' Association:

"On August 28 the Scientific Section of the American Drug Manufacturers' Association held a meeting at the Waldorf-Astoria, New York City, at which President Sayre of the A. Ph. A. was a notable guest.

"One of the actions of greatest moment took the form of a recommendation that extracts of aconite leaves be deleted from manufacturers' price lists on the ground that there is practically no demand for these troublesome preparations. In connection with the subject of aconite it was also decided to recommend the recognition of Japanese aconite in the U. S. P., but as a separate drug, since its constituents are somewhat different. It is thought that its admission would relieve the shortage of aconitine, of which there is none available in this country at this time.

"Attention was also given to the fact that some of the menstrua of the U. S. P. are not entirely satisfactory and that, as a result, manufacturers are in many instances obliged to list a formula providing a special menstruum of their own in addition to the formula of the U. S. P., thus multiplying to a degree that is vexatious to both manufacturer and dealer the number of preparations to be carried in stock. With a view to simplification, a subcommittee was appointed to collect the experience of manufacturers on unsatisfactory menstrua and to endeavor to compile a simpler list of menstrua that they will be able to recommend to the Committee of Revision as meeting the approval of all manufacturers.

"If the Executive Committee of the Association adopts a sug-

gestion emanating from Dr. F. R. Eldred of Eli Lilly & Co., the American Drug Manufacturers' Association will take a notable place in the field of fundamental pharmaceutical research. Dr. Eldred proposed that the Association retain the services from time to time of eminent research workers to conduct exhaustive researches on certain drugs of which comparatively little is known and to publish the results of their work for the benefit of all. It was thought that a place might be found for the work in the Mellon Institute and it was remarked that an investigator would progress at an immeasurably faster rate than if working alone since he would have the benefit of the facilities and experience of the laboratories of almost all the pharmaceutical manufacturers of the country. The "Constituents of Digitalis" was suggested as the subject of the first of these treatises for, while the literature of digitalis is voluminous, the subject is left in a most unsatisfactory condition. The section recommended careful consideration of Dr. Eldred's proposal by the Association's Executive Committee.".

This is another welcome evidence of the increasing interest that is being manifested on the subject of pharmaceutical research. The pharmaceutical manufacturers who are associated in this organization are in a most favorable position to learn not only of the necessities for scientific investigations and for the broadening of the scope of pharmaceutical research but, likewise, to render valuable assistance in such studies.

Since the development of the industry of manufacturing pharmaceuticals, many valuable contributions to our knowledge of drugs, their actions, constituents, methods of standardizing, and the best forms for exhibition as remedial agents, have emanated from the laboratories of these manufacturers. Many of these resulted from investigations of the problems that arose in the manufacture or marketing of commercial products and so had more or less bearing upon the business with which the investigators were connected. Nevertheless, with the true scientific spirit the information gleaned has been broadly disseminated with only an occasional attempt at reservation for personal advantage. It is especially pleasing to note that an organization such as the American Drug Manufacturers' Association, composed of representatives of firms and corporations that are vitaly interested in commercial porblems, has assumed such a broad philanthropic attitude and that it is proposed that the research work carried on under its auspices or by its grants shall not

be undertaken for purely commercial reasons but in an altruistic spirit for the service that such investigations may render to science and humanity.

The current issues of the AMERICAN JOURNAL OF PHARMACY and of at least several of the other pharmaceutical journals, as well as the past issues, contain many valuable contributions that evidence scientific study and research work and demonstrate that there is no foundation for the heedless criticism that has at times appeared in some quasi-pharmaceutical journals as to a lack of research work in pharmaceutical circles. Nearly every monograph, formula or standard, in the U.S.P. or the N.F. is the result of study and in many cases of scientific investigation and pharmaceutical research and contraverts such flippant statements.

The truth is that the field open to pharmaceutical research is of such a wide scope, that the work already accomplished, even though of great magnitude, serves but to present to our view the enormity of the possibilities, the unlimited field of scientific investigations open to pure pharmacy and its collateral sciences that have not yet been made the subject of complete investigations.

We are heartily in accord with the proposition so ably presented in the address of President William Kirby of the British Pharmaceutical Conference, that coöperative research in pharmacy should be undertaken in institutions in which botanical, chemical, pharmacological and bacteriological work can be carried out. In this connection, it is not amiss to direct attention to the fact that at least some of our colleges of pharmacy are well equipped with such departments and the several laboratories essential and are prepared to carry out such coöperative research work, and this should be kept continuously in mind in the selection of subjects and the making of awards for such scientific investigations.

The Mellon Institute has performed valuable service in the making of many able scientific investigations, but it is probably not better equipped to undertake pharmaceutic investigations than are some of our colleges of pharmacy with their laboratories and their libraries of literature pertaining to pharmaceutic subjects and members of their faculties more thoroughly acquainted with the distinct problems of pharmacy and the investigation already made and the methods of pharmaceutical research, and whose students are likewise in a position to render aid by coöperative studies.

The drug trade organizations should not overlook the possibility

of utilizing to the fullest extent the pharmaceutical institutions and the facilities there available for pharmaceutic research. To ignore these would be a serious error and a disregarding of the work already accomplished by pharmacists or now in process and might well be construed as a reflection cast upon the ability of such investigators and the many contributions to science emanating from pharmacists. Conversely, the placing of the responsibility for research work such as is contemplated in the above announcement with pharmaceutical schools should be of material aid to such institutions of learning and redound to the credit and benefit of pharmacy. The very subject suggested for the initial investigation under this patronage, is an excellent illustration of the problems that call for investigation by those who are especially trained as pharmaceutic investigators and acquainted with the existing voluminous literature relating to the subject.

In recent years, much has been written concerning a proposed confederation of all of the drug trade organizations and the pharmaceutical associations in the United States. The discussion and the effort was directed toward a universal coöperation and coördination of all lines of pharmaceutical activities whether intended to cover professional, educational, legislative, commercial or other needs. The diverse interests served by the many drug trade and pharmaceutical organizations precluded the consummation of such a Utopian plan for general coöperation. The objections that were voiced against federation on such a varied line of activities could not apply to the organization of a federation whose prime purpose was to encourage, to stimulate, and to promulgate research study and investigations in pharmacy with the understanding that the results so obtained are to be made public and available to all alike.

Such a federation as here suggested could readily be formed of named delegates from all of the various pharmaceutical and drug trade organizations and would constitute a body under whose direction a comprehensive scheme of research in pharmaceutical subjects could be mapped out and systematically carried on. The title selected might be The American Committee on Pharmaceutical Research, The American Council on Pharmaceutical Research, The American Institute for Pharmaceutical Research, or The American Endowment for Pharmaceutical Research. A portion of the profits accruing from the sale of the U. S. Pharmacopœia and the National Formulary, contributions from the various trade organizations, sup-

plemented by endowments, donations, and bequests from individuals should provide for the financial support of such a research organization that would be truly representative of pharmacy and in an unselfish service perform the great work that would thus be made possible for science and the benefit of the entire world.

Such a plan is needed to make possible any systematic and extensive scheme for pharmaceutical research. The efforts of individual societies in this direction are necessarily restricted and too limited to accomplish very much. At the recent meeting of the American Pharmaceutical Association, the funds available for the Committee on Research would permit of but one award although the Committee had before it several other meritorious requests for allowances for investigations of important subjects that doubtless would likewise have appealed to the members of the American Drug Manufacturers' Association.

G. M. B.

DENATURED ALCOHOL REGULATIONS.

The attention of dealers in denatured alcohol is directed to the following instructions and regulation that has been issued by the Bureau of Internal Revenue.

TREASURY DEPARTMENT, OFFICE OF COMMISSIONER OF INTERNAL REVENUE, WASHINGTON, D. C.

August 30, 1919.

Non-Bev-Al. Mim. 2248.

To Collectors of Internal Revenue,
and Revenue Agents in Charge:

T. D. 2914 issued today and showing additional matter to be affixed to containers of completely denatured alcohol, is called to your especial attention.

Reports recently received in the bureau establish that completely denatured alcohol is being used extensively for bathing and rubbing purposes. This is contrary to the law and regulations and such uses cannot be tolerated, as the completely denatured alcohol is highly injurious to the skin and animal tissue.

It is also established that completely denatured alcohol is being sold by irresponsible dealers under such circumstances as to assure them that it is being used for beverage purposes. Where it is so

used for any length of time blindness inevitably ensues and the continued use can only result in death.

Collectors should use every means at their disposal to make known to the public the dangers of either external or internal uses of completely denatured alcohol. Wherever collectors or revenue agents in charge hear of a misuse of completely denatured alcohol, a most thorough and careful examination should be made immediately and all the facts fully reported to the commissioner for the infliction upon the responsible parties of the ultimate penalties provided by law.

J. H. CALLAN,
Acting Commissioner.

(Additional matter to be printed on labels affixed to wholesale or retail packages of completely denatured alcohol.)

TREASURY DEPARTMENT, OFFICE OF COMMISSIONER OF INTERNAL REVENUE, WASHINGTON, D. C.

To Internal Revenue Officers and Others Concerned:

In view of the grave and extended abuses of the use of completely denatured alcohol reported, it is deemed necessary to print upon the labels affixed to wholesale and retail packages a further and more specific warning as to its use than is shown on the present required label.

In addition to the present matter on the labels there will be required on all new labels hereafter the printing in large letters in red ink under the skull and bones symbol, the word: Poison, and at the bottom of the label there will be printed the following statement:

"Completely denatured alcohol is a violent poison. It cannot be applied externally to human or animal tissue without seriously injurious results. It cannot be taken internally without inducing blindness and general physical decay, ultimately resulting in death."

Until the present stocks of labels are exhausted this additional matter may be affixed to the containers on a separate label pasted above the present required label.

J. H. CALLAN,
Acting Commissioner.

Approved August 30, 1919:
CARTER GLASS,
Secretary.

CHLORETONE: TRI CHLOR TERTIARY BUTYL ALCOHOL. A DESCRIPTION OF SOME OF ITS PROPERTIES.

By Herbert C. Hamilton,
Detroit, Mich.

This is a compound formed by the direct union of chloroform and acetone, a reaction which is initiated by a caustic alkali. Willgerodt[1] discovered the reaction in 1881 and produced the compound which he called acetone-chloroform. When purified by steam distillation, or when recrystallized from water, it melts at 80°–81° C., somewhat higher when freed from water by distillation.

Chemical Properties.—The empiric formula for chloretone shows it to be apparently a direct combination of chloroform and acetone. Its structural formula, however, indicates that the compound takes on the formation of an alcohol and thus accounts for the chemical designation of tri chlor tertiary butyl alcohol. It is soluble in most organic solvents and oils and is soluble in water—about 0.8 per cent.—from which it crystallizes in slender, white needles.

Physiological Studies.—The physiological actions of this compound have been studied by Abel and Aldrich,[2] Kossa,[3] Vamoosy,[4, 5] Houghton and Aldrich[6, 7] demonstrating its action as a local and general anesthetic and as a hypnotic and sedative.

As a General Anesthetic.—It has become the general anesthetic of choice for work on laboratory animals, its exceptional value depending upon the fact that it is safe and relatively non-toxic, and that one dose is sufficient to maintain complete anesthesia for several hours uncomplicated by any serious effects on the heart and circulatory system. This applies only to such experimental work as involves an examination of the pharmacologic properties of drug or gland extracts, for example, the standardization of extracts of the suprarenal and pituitary glands where the effect is to raise the blood pressure, study of the digitalis series of heart tonics which affect primarily the circulatory system, of aconite and veratrum which are circulatory depressants, of blood coagulants which act to decrease the time of blood clotting.

For operations in which the recovery of the patient is of first importance, chloretone can be used in conjunction with morphine by which complete anesthesia can be accomplished using a sublethal

dose of the chloretone but a dose large enough to prolong the anesthesia over a period of several hours. The technic for such work has been well described by Rowe,[8] for while there is no difficulty involved, attempts to apply this method of anesthesia have not always been successful.

As a Hypnotic and Sedative.—Another very common use made of chloretone is to allay the nausea due to seasickness. This is probably brought about, not only by the sedative and anesthetic action of the drug on the stomach lining, but also by the general action on the central nervous system. Autopsies show that more chloretone is found in the brain than in any other organ of the body, which is a logical finding in view of its exceptional efficiency as a general anesthetic. While it is a highly volatile product, it appears not to be eliminated by the lungs nor as such, in the urine, but is finally decomposed as shown by an increase in the chlorides. Chloretone is regarded by the medical profession as producing the closest approximation to natural sleep that has yet been discovered, in its safety and reliability and in the fact that no unpleasant after effects are experienced. The substance is carried to the cerebral tissue and profound sleep occurs. After a time as the chloretone is gradually broken up and carried away chemical activity is renewed in the brain cells and the patient awakes, refreshed as from natural sleep.

The mode of administration seems to have little influence on its absorption, for animals kept in an atmosphere saturated with vaporized chloretone are anesthetized, in time almost as completely as if it were administered internally.

Insecticidal Action.—This action of the vapor suggested its use as a substitute for naphthalene as an insecticide for clothes moths. Experiments were carried out on moths, flies and mosquitos which showed that for the latter insect chloretone is four times as effective as sulphur fumes and almost as effective as the latter for moths and flies. It is as effective for moths as naphthalene without the objectionable odor of the latter.[9]

In these experiments weighed quantities of the substance were vaporized in a bell jar or in a laboratory hood of known capacity and the condition of the insects or animals carefully noted. It requires four or five hours to anesthetize guinea pigs and it is necessary to volatilize the chloretone slowly, carrying the vapors in with a current of air. For insects which require less air the rapid volatilization in a short time is somewhat more effective than the slower method because of its prompt action.

As a Local Anesthetic.—When chloretone is tested by some of the laboratory methods used for comparing local anesthetics it is found to be surprisingly effective. Tested on the sciatic nerve of the frog one of the standard methods applied for substances of this character and compared to cocaine the results are as follows:

Chloretone.

	0 Min.	5 Min.	10 Min.	15 Min.	20 Min.
0.8 per cent. solution.....	—	±	+	+	+
0.4 per cent. solution.....	—	—	+	+	±
0.2 per cent. solution.....	—	—	—	±	±

Cocaine.

1 per cent. solution	—	±	+		
0.5 per cent. solution.....	—	±	+		

Another test applied to local anesthetics is to measure the anesthetic action on the frog's skin. This is always moist and is comparable to the mucous membrane. The test is carried out by dipping one leg of the frog into the solution to be tested, leaving the other undipped as a normal for control. After contact for a determined time both legs are dipped into a very dilute solution of HCl —about 1-500. Anesthesia can be measured by finding the maximum dilution which is effective and comparing with a solution of cocaine of equal activity. The following results were obtained:

Chloretone.

Minutes.	0.8 Per Cent. Solution.	0.4 Per Cent. Solution.	0.2 Per Cent. Solution.
0	—	—	—
2	+	+	—
5	+	+	±
8	+	+	—
10	+	±	—
15	+	—	—

Cocaine.

Minutes.	1 Per Cent. Solution.	0.5 Per Cent. Solution.	0.25 Per Cent. Solution.
0	—	—	—
2	—	—	—
5	±	±	—
8	±	±	±
10	+	+	±
15	+	±	—

Note.—Minus, —, no anesthesia. Plus, +, complete anesthesia. Plus minus, ±, partial anesthesia.

As an anesthetic for the mucous membrane, therefore, it is even better than cocaine, and in its direct action on the exposed nerve as on the sciatic nerve, the anesthesia is as prompt and as lasting as that of cocaine.

It fails, however, to replace cocaine because of its low solubility. It is precipitated in the tissues and is rather irritating and ineffective on that account. Its local action on the sense of taste is shown by the fact that its rather bitter disagreeable taste is only momentary in the mouth but when the solution reaches the throat the objectionable taste is again evident.

Aside from the wide applicability of chloretone as a general anesthetic, its most valuable property is as a germicide and antiseptic, the properties essential in a preservative. If the "bone-dry" legislation keeps on, chloretone will be one of the few preservatives left for organic medicinals.

Germicidal.—As a germicide it has a phenol coefficient of 1.2, that is, when tested by the Hygienic Laboratory method of evaluating disinfectants it as as effective in 0.8 per cent. solution or 1–120, as phenol diluted 1 in 100, that is, a culture of *B. typhosus* is killed when exposed to the action of either of these two disinfectants for two minutes.

Tests by the A. P. H. A. Phenol Coefficient method[10] are given for chloretone and phenol.

For an antiseptic test the two latter organisms were inoculated in medium saturated with chloretone. In no case was growth observed over a period of three weeks. Tested against other more resistant organisms it is found that in most cases to be effective it requires a longer time than a disinfectant can be expected to act and therefore that it must be classed as a preservative or antiseptic rather than a germicide. For this purpose, with but few exceptions, it is ideal; even the highly resistant hay bacillus, *B. subtilis,* fails to develop in a solution saturated with chloretone. In some instances where the solution is an exceptionally good medium for the growth of bacteria it requires more than 4 days to become sterile, but evidence of growth is not apparent. It is absolutely essential that the container be closed against the volatilization of the chloretone and a full container is advisable because of the tendency of chloretone to crystallize on the walls above the solution. This may be due to supersaturation but if so it is a condition to be retained if possible.

GERMICIDAL EXPERIMENTS.

Typical Test of Phenol.

Dilution.	Time and Results, Minutes.			
	5.	10.	15.	20.
1–100	—	—	—	—
1–110	+	—	—	—
1–120	+	+	—	—
1–130	+	+	+	—
1–140	+	+	+	+

Test of Chloretone.

Saturated Aqueous Solution. (B. Typhosus.)

Dilutions.	Time and Results, Minutes.			
	5.	10.	15.	20.
5 cc. 0.8 per cent. sol. + 0 cc. water	—	—	—	—
9 cc. 0.8 per cent. sol. + 1 cc. water	+	+	—	—
8 cc. 0.8 per cent. sol. + 2 cc. water	+	+	+	+
7 cc. 0.8 per cent. sol. + 3 cc. water	+	+	+	+
6 cc. 0.8 per cent. sol. + 4 cc. water	+	+	+	+

+ means growth.

— means no growth in subculture.

Staphylococcus.

	5 Min.	10 Min.	15 Min.	20 Min.
0.8 per cent. solution	+	+	+	+

Spores of Hay Bacillus. (B. Subtilis.)

	1 Hr.	2 Hr.	3 Hr.	4 Hr.
0.8 per cent. solution	+	+	+	+

Mould Spores.

	1 Hr.	2 Hr.	3 Hr.	4 Hr.
0.8 per cent. solution	+	+	+	+

Such a solution can be obtained by adding the chloretone in a saturated alcoholic solution, by heating the chloretone in water, or by allowing several days for complete saturation.

As a preservative against mould spores it has not proved entirely satisfactory for serums and heavy organic solutions. The strains used in this experimental work have, however, invariably

failed to develop in an agar-bouillon medium but in practice moulds occasionally appear showing either loss of chloretone through volatilization or the presence of a more resistant variety. It seems probable that the occasional development of mould in pharmaceutical preparations preserved with this agent is due to a deficiency of the agent rather than a more highly resistant mould because of failure to obtain a saturated solution or a decrease in the chloretone content from other causes.

It is the purpose of this paper to emphasize two of the properties of chloretone which seem to be exceptionally valuable and which should commend it to laboratory purposes. First, as a general anesthetic for animal experimentation, it has no equal because of its long-continued action and non-interference with the circulatory system. Second, as a preservative where its antiseptic and germicidal action can be relied upon to prevent the development of bacteria and ultimately to kill the organisms which not only impair the appearance, but also destroy the valuable properties of organic solutions. It can be used in many cases where the preservative action of alcohol must be eliminated and especially where sterilization by heat is impracticable because of its destructive action on sensitive organic compounds.

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FROM THE RESEARCH LABORATORY,
PARKE DAVIS & CO.,
DETROIT, MICH.

A REVIEW OF THE ADVANCES IN PHARMACY.

By John K. Thum, Ph.M.,

THE LANKENAU HOSPITAL, PHILADELPHIA.

The Decimal System in Trade.—Under the caption "Banish the Dozen System" the Philadelphia *Public Ledger* in a recent issue strongly advocates the use of the decimal system in trade. The drug trade in its advocacy of the metric system has always laid great stress on the fact that our money system is based on the decimal; this newspaper also brings out this argument to buttress its plea. We consider this editorial so peculiarly apropos that we would feel ourselves remiss in our duty to the profession if we failed to quote this timely article:

"One of these fine days a person may go to a store and ask for a dozen eggs and be told eggs and other things no longer are sold by the dozen but by the decimal system.

"And why shouldn't they be sold that way? America has the decimal money system. It should not have another in trade.

"There is as much confusion in the systems of weights and measures as there is confusion in languages. The British have a 'stone' and a quarter. How many Americans know what these terms signify? The British also have a farthing, a penny (which is equal to our two cents), a sovereign, a pound, a guinea and other measurements of money.

"No system is so simple as the decimal. This fact is being appreciated by business men. The rubber companies of America have adopted it. One of them, writing to the secretary of commerce, says:

> "We will not claim the honor of being the exact pioneer in this movement, as it was agreed among all rubber companies hereafter to price everything in the unit system, and our factory adopted the 100-unit as a price basis. This reduces at once the cost of a single article by moving the decimal point two figures or, in other words, you have the price of each piece of goods in a single unit at a glance.

"The Department of Commerce, in an investigation it has made, finds the decimal gives satisfaction and minimizes mistakes, as units of 10, 50 and 100 are more easily accounted for than dozens, and the gross, which is a dozen dozen. The company whose report is quoted packs its goods in lots of ten, twenty-five, fifty and 100.

"The department quotes a knitting company of California, which says it 'feels certain that many weary-brain hours could be saved by the elimination of the dozen unit, as this also involves the translation of price from dozen to single pieces, or a division by twelve.'

"Banish the dozen."

What is a Pharmacist?—In the *Chemist and Druggist* of May 10 the foregoing question is asked and then answered in a quotation from Edward R. Squibb, which deserves to and probably will go down to pharmaceutical posterity as a classic: "A pharmacist is not a druggist. A druggist is a merchant of drugs, a dealer in substances which, though originally used in medicines, came to be used in many other arts. The pharmacist, synonymous with pharmaceutist and apothecary, but not with druggist or chemist, is an educated, qualified practitioner of the art of pharmacy. He is a dealer in substances used to prevent and relieve distress; who has the knowledge and skill to secure a proper quality in his merchandise; to prepare this for its ultimate uses; and to secure it against accident and criminal misapplication. The druggist is a merchant like the grocer, the dry-goods dealer, etc. The pharmacist may be all this, but must be very much more."

A National Department of Health.—Hon. Joseph I. France, United States Senator from Maryland and chairman of the Senate Committee on Public Health and National Quarantine, has introduced in the senate a bill with the above title which covers the subject in a very broad way. This makes the third bill now before Congress, a fact which shows clearly that the need and usefulness of an efficient national department of health is becoming more apparent every year and especially since our entrance into the Great War. The result of the physical examination of many of our draft recruits, a rejection of nearly 29 per cent., is a good argument for showing the necessity of the government taking an intelligent and active interest in the health of its people, and the conditions and environment that promote health and general well-being. For instance, what a tremendously important thing it is for the people to know something about the need of proper care of public water supplies and proper disposal of excreta, especially in the rural sections of our country. This matter could be more readily pressed home to the people if planned on a national scale with the full force and power of the government supporting it.

The bill, which is called Senate Bill 2507, provides for a department of public health under the direction of a secretary, who is made a member of the cabinet, and three assistant secretaries, the first assistant to be a man with medical training, with knowledge of public health measures, including sanitation; the second to be thoroughly grounded in vital statistics; and the third to be a woman trained in medicine or nursing and public health. It is proposed in the bill that the U. S. Public Health Service and Bureau of Chemistry be placed under the jurisdiction of the department, which is also to have a bureau of vital statistics, sanitation, hospitals, child and school hygiene, quarantine, food and drugs, nursing, tuberculosis and personnel. The secretary of public health is directed to communicate with the governor of each state requesting him to recommend to the state assembly suitable legislation with sufficient appropriation of money to secure coöperation between the federal department of public health and the state board of health. Every state taking such action will be entitled to a proportionate share of such money as may be appropriated by Congress for carrying out the provisions of this act. The bill provides for the division of the country into health states, districts, subdivisions and precincts, each conforming to the geographical boundaries of the various political divisions. The bill also provides for coöperation with the Departments of Commerce, Labor and the Interior in the collection of vital statistics and to establish a uniform system of cards, records and reports regarding diseases, disabilities, industrial accidents, births, deaths, physical condition of school children, the number and conditions of existing hospitals, etc. The bill provides for an appropriation of $15,000,000 for 1920 to be divided among those states, in proportion to their population, who comply with the requirements of the law and likewise appropriate a sum equal to the federal contribution, and make full and complete reports of deaths, births, etc. An appropriation of $48,000,000 is made for the erection of sanatoriums and hospitals, to be divided among the various states in proportion to their population, each state of course contributing an equal amount. Undoubtedly the time seems ripe for the inauguration of a comprehensive plan for looking after and safeguarding the public health from every standpoint. Certainly human rights should be regarded by the Government as being at least on a par with property rights. A healthy people is a nation's most important

asset. "Lest we forget" let us bear in mind the terrible time of the "flu" last year.

Rapp's Method for the Estimation of Alkaloids.—It is claimed that this method gives very satisfactory results, but it is necessary that the amount of plaster of Paris added should be just sufficient to prevent the mixture from hardening, in fact a soft paste-like mixture answers very well. A preliminary blank trial with the plaster to be used is desirable. In the original method it is desirable to make sure by an extra shaking with 10 mils of chloroform that all the alkaloid has been extracted from the mass. Uncertainty may be avoided by dissolving the alkaloid first with chloroform before the addition of the plaster and then proceeding with an aliquot portion of the filtered extract for the estimation. As an example, in the determination of cinchona bark, the substance is treated with the quantity of liquid advised by Rapp and then agitated in the same flask with 50 mils of chloroform, made alkaline, and shaken with 25 grams of plaster of Paris. The chloroform is then filtered off and the filtrate shaken with tenth-normal acid. The plaster paste in this case may be of any degree of stiffness, as it does not have to be washed out, all the alkaloid having been dissolved by the chloroform previous to the addition of the plaster. In view of the excellent results obtained it is suggested that the principle of Rapp's method be applied to other extraction operations besides those with alkaloids, as the use of plaster has a clarifying effect and assists the separation of the extract.—*J. Pharm. Chim.*, 1919, 19, 295, through *The Analyst*, July, 1919, page 236.

Iodine Value (Wijs) of Palm Kernel Oil.—The normal range of iodine values for palm kernel oil is 16 to 23. The average value for 574 samples of refined oil was found to be 18.1, and for 1,236 samples of crude oil 18.6. The oils worked with in this investigation were expressed from the kernels crushed in the mill under ordinary works conditions.—*J. Soc. Chem. Ind.*, 1919, 38, 128, thruogh *The Analyst*, July, 1919, page 237.

Analysis of Prune Kernels.—Prune kernels gave a yield of 42 per cent. of oil, 2.47 per cent. of nitrogen, and 37.42 per cent. of sugars. When cooled to 5° C. the oil partially solidified, the solid portion being about one third of the whole amount. The sp. gr. of

the solid part being 0.9055, the saponification value 239.8; the liquid portion had a sp. gr. 0.9119, and saponification value of 207.4. The sugars found present were lævulose, dextrose, and possibly cane sugar.—*Chem. News,* 1919, 118, 242–243, through *The Analyst,* July, 1919, page 238.

Estimation of Lactose and Proteins in Milk Preserved with Potassium Dichromate.—Polarimetric estimation of lactose in milk containing this chemical as a preservative is unreliable, as the quantity of sugar found decreases gradually until after about 70 days only 50 per cent. of the amount originally present is obtained. However, the quantity of lactose does not show any decrease during this period, when it is estimated by determining its copper-reducing activity. Casein also shows considerable change; while the quantity of total protein remains the same, the casein (protein precipitated by acetic acid) decreases 2.58 to 2.10 per cent. in 40 days.—*Ann. Falsific.,* 1919, 11, 78–79, through *The Analyst,* July, 1919, page 237.

Oil of Ceratotheca sesamoids.—The plant is allied to *Sesamum indicum* (Gingelly), and the specimen investigated came from the Gold Coast, and is known in that region under the name "Bungu."

The seeds are similar to the white *Sesamum indicum* in general appearance, somewhat reddish brown in color and larger than the latter, 100 seeds weighing 0.34 and 0.24 respectively. The seeds are more flat than *Sesamum indicum,* and the edges are darker in color than the rest of the seed and have a serrated appearance.

On extracting the ground seed with petroleum ether there was obtained 35.47 per cent. of a pale yellow oil with a slight nutty flavor. On standing there was precipitated some "stearine."

The following analytical figures were obtained for the oil:

Saponification value	190.20
Unsaponifiable matter	1.53%
Iodine value	110.60
Refractive index at 40° C., zeiss.	59.60
Free fatty acids (as oleic)	0.63%
Specific gravity 15° C.	0.9163
Baudouin reaction	negative.
Halphen reaction	negative.

That the Baudouin test, which is such a delicate color reaction for *Sesamum indicum,* should prove negative is noteworthy, in view

of the fact that this plant is so closely related to *Sesamum indicum.* One would expect it to be otherwise, as in the case of the Halphen test for cottonseed oil, which is also given by Kapok oil, the plant from which this oil is obtained being closely related to the cotton plant.

The other results obtained with this oil are within the limits for sesamé oil, although the specific gravity is somewhat lower.

The oil is edible, and could be made of use in the manufacture of margarine, etc., if the seed were obtainable in large enough quantities. Its low free fatty acid content and relatively slight taste should make it available for the preparation of edible oils.—*The Analyst,* July, 1919, page 233, E. Richards Bolton.

Reaction of Aconitine.—The red color, mentioned by Dragendorff as characteristic of this alkaloid, produced when aconitine is heated with phosphoric acid, is usually only obtained with amorphous products. The pure crystalline aconitine heated with phosphoric acid (sp. gr. 1.7) yields only a faint gray color. By using a mixture of the acid (25 grams) and sodium molybdate (1 gram), a brilliant violet coloration is produced with samples of crystalline aconitine which give no color with phosphoric acid alone. Of the other common alkaloids the only ones that give color reactions that could be mistaken for the aconitine reaction are aspidospermine (deep violet) and veratrine (violet red). The first may be differentiated from aconitine by the action of oxidizing agents, and the other by the action of mineral acids.—*J. Pharm. Chim.,* 1919, 19, 295–296. L. P. J. Palet, through *The Analyst,* July, 1919, page 236.

Influence of Various Ammonium Salts on the Precipitation of Magnesium Hydroxide.—The writer of this paper shows that the sulphate of ammonium is rather more effective than the chloride in holding up magnesium hydroxide. This fact does not agree with the theory given in many text-books to explain the mechanism of the hindrance that ammonium salts have on the precipitation of magnesium salts. Unsuccessful attempts were made to apply this knowledge to the separation of calcium and magnesium. Aside from the fact, in presence of sulphates, solutions of calcium salts must be highly diluted, which is inconvenient, the writer has failed to obtain exact or even concordant results.—*Helv. Chim. Acta,* 1919, 2, 277, through *The Analyst,* July, 1919, page 245.

PHARMACY IN THE ARMY AND NAVY DISCUSSED BY THE N. P. S. A.

A meeting of the National Pharmaceutical Service Association was held on the evening of August 28 at the Hotel Pennsylvania, during the Convention of the American Pharmaceutical Association, and everyone was cordially invited to be present.

The President, Dr. Frank Cain of Cincinnati, presided, and read an address urging the joint effort of pharmaceutical organizations, working in harmony with physicians toward the proper recognition of pharmacy in the Army and Navy. He also presented the following letter from the Surgeon-General, which was received with applause and recognized as the beginning of the cordial relationship which will undoubtedly result in the adequate recognition of pharmacy:

WAR DEPARTMENT
OFFICE OF THE SURGEON-GENERAL
WASHINGTON

August 14, 1919.

PROFESSOR E. FULLERTON COOK,
145 North Tenth Street,
Philadelphia, Pa.

My dear Dr. Cook: I now desire to give you in writing the substance of the observation we had on August 11, in regard to commissions for pharmacists in the medical department of the Army. I think it is most important for the future welfare of the medical department to have a service corps for commissioned officers. To become an officer in this corps, it will be necessary for an applicant to enlist in the medical department and serve for a period of about five years. During this time he will be given an opportunity to perfect himself in hospital administration, quartermaster's duties, motor transport service, mess management, registrar's duties, pharmaceutical work, and the general duties of the hospital corps. It will be one of the requirements that an applicant for a commission in the service shall be a non-commissioned officer for three years of his five-year enlistment. The duties of the officers of the service corps will be to act as adjutants of our large hospitals, property officers, mess officers, transport officers for the ambulance companies, and various other duties of non-professional character, connected with the medical department, for which we now have to use a highly trained medical officer.

I have recommended to the General Staff that a service corps for the medical department be incorporated in the army reorganization bill now before Congress, and I sincerely trust this corps will be authorized.

I am perfectly willing that a limited number of vacancies in the service corps shall be set aside for men who specially qualify themselves as pharma-

cists, and in the course of instruction which candidates for the service corps will have to take, suitable provision will be made for advanced instruction in pharmaceutical work.

After our very frank discussion of the needs of the medical department for pharmacists, I think we both agree that this will solve the question in a most satisfactory manner.

With cordial regards, believe me
Very sincerely yours,
(Signed) M. W. IRELAND,
Surgeon-General, U. S. Army.

The President believed that the proposal of the Surgeon-General should be carefully considered and that a conference should be held with the Surgeon-General by a committee representing the several pharmaceutical organizations, and by this means to arrive at a plan whereby the association can assist the Surgeon-General in his effort to establish a "service corps" and also provide a better status for pharmacists in the corps.

It was believed that the five years of non-commissioned service as a prerequisite to commissions should be modified for those men who have adequate scientific training, although the Surgeon-General's desire that the candidate for commission should have thorough military training was recognized as essential.

The Secretary presented a statement of the general situation in both the army and navy, calling attention to the fact that the Hospital Corps Bill known as H. R. 4760 has been combined in what was known as the Personnel Bill, and hearings will be granted some time this fall. The importance of securing the approval of the Secretary of the Navy was emphasized, and since then it has been learned that this will be of vital importance in obtaining the favorable consideration of the Naval Affairs Committee. Every effort should be made to enlist the interest and secure the approval of Secretary Daniels.

Colonel Frederick M. Hartsock, of the Surgeon-General's office, was present and spoke of the excellent work done by pharmacists in the Army, which was recognized as indispensable. He said the general staff had not yet worked out the details of the reorganized army, but that pharmacy should, in his opinion, be given adequate recognition. He recommended that proper presentation be made by pharmacists of their cause and that a definite plan be worked out and presented to the Surgeon-General. A vote of thanks was extended to Colonel Hartsock for his frank statement and evident interest in pharmacists in the service.

Mr. Beringer, in expressing appreciation for the statement made by Colonel Hartsock, expressed the hope that Colonel Hartsock would take back to the Surgeon-General's office the sense of this meeting and of this Association, which had always stood for co-operation with the Surgeon-General and whose desire was to give the army and the navy the most efficient aid and trained service which pharmacy could offer and only asked for an opportunity on a basis which would permit the best service.

Lieutenant W. T. Minnick, of the Hospital Corps of the Navy, then spoke of the work of the pharmacist in the navy. He stated that a Surgeon-General is compelled to take the view of the best interests of the entire service in recommending a preliminary military training before receiving commissions. He explained the many activities of the pharmacist in the navy and the need for thorough training. The Association voted a motion of thanks to Lieutenant Minnick for his clear exposition of the situation in the navy.

Mr. Charles F. Harding, President of the National Association of Retail Druggists, was present and promised the coöperation of the N. A. R. D. in every proper effort which would be started to insure proper recognition of pharmacy in the army and navy, and he suggested that all interests get together in a conference and devise a plan upon which all could unite. In the limited time available, the general subject was discussed by Professor Spease of Cleveland, Mr. Mayo of Cincinnati, Captain MacCartney, a pharmacist who served in the department of supplies in the Surgeon-General's office throughout the war, and by others.

Mr. Beringer moved that a committee be appointed by the President to endeavor to secure an early conference with the Surgeon-General of the Army, if possible in coöperation with similar committees from other national pharmaceutical associations, presenting the views of American pharmacy concerning the Surgeon-General's suggestion for the organization of a "service corps," and the recognition of pharmacy as set forth in his letter of August 14, endeavoring to arrive at a mutually satisfactory plan for the establishment of pharmacy in the army. This motion was seconded and unanimously approved. Dr. Cain, the President, appointed on this committee for the conference with the Surgeon-General of the Army, Mr. George M. Beringer, chairman, and Mr. Caswell A. Mayo and Mr. E. Fullerton Cook as the other members.

SUMMARY OF THE PROCEEDINGS OF THE TWENTIETH ANNUAL MEETING OF THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES.

PREPARED BY THEODORE J. BRADLEY,

Secretary.

The twentieth annual meeting of the American Conference of Pharmaceutical Faculties was held at the Hotel Pennsylvania, New York City, on August 25–26, 1919. Delegates were in attendance from about thirty colleges located in twenty-four states. The President, Dean Charles B. Jordan of Purdue University School of Pharmacy, Lafayette, Indiana, presided at all sessions and his presidential address was one of the features of the meeting. Of the constructive recommendations made by the President, the following were adopted after consideration and report by a special committee on the address:

1. That the dues be increased from ten dollars to twenty-five dollars per year for each member college, and that the entrance fee shall be twenty-five dollars hereafter.

2. That the Executive Committee prepare a budget showing the amounts that can properly be expended by the standing and other committees of the Conference for expense.

3. That the Executive Committee take steps to have the Conference coöperate with other organizations to suitably memorialize the service rendered by pharmacists in the Great War.

4. That the Conference approve the exchange of lectures between members of the faculties of member colleges.

5. That a special committee be appointed to prepare a memorial to the Carnegie Foundation, requesting that an investigation be made of pharmaceutical education in the United States, similar to the investigations already made of medical education, dental education, etc.

6. That the Conference appoint a special committee to collect and distribute information on prerequisite legislation to aid in the securing of such legislation in states not yet having a prerequisite in pharmacy, this committee to act jointly with a similar committee of the National Association of Boards of Pharmacy.

7. That the Conference reaffirm its adoption of high school graduation as a requirement for entrance to all member colleges

after July 1, 1923, and to recommend that this entrance requirement be made effective at an earlier date when possible.

The Secretary-Treasurer, Theodore J. Bradley of Massachusetts, presented his report, in which the President's recommendation that the dues in the Conference be increased was endorsed. The total receipts of the Conference for the past year amounted to $492.66 while the expenditures were $863.72, the deficit being made up from the accumulated balance in the treasury. The balance on hand July 31, 1919, was $686.27, of which $600 is invested in Liberty Bonds.

Reports of the various standing and special committees were received as follows:

Executive Committee, J. A. Koch of Pennsylvania, Chairman;

National Syllabus Committee, T. J. Bradley of Massachusetts, Chairman;

Committee on Higher Educational Standards, W. J. Teeters of Iowa, Chairman;

Committee on Faculties, Zada M. Cooper of Iowa, Chairman;

Committee on Curricula and Teaching Methods, J. W. Sturmer of Pennsylvania, Chairman;

Committee on Activities of Students and Alumni, R. A. Lyman of Nebraska, Chairman;

Committee on Relations of Pharmacy Schools and Other Professional Schools, W. F. Rudd of Virginia, Chairman;

Committee on Research, Henry Kraemer of Michigan, Chairman;

Committee to Consider and Report on the Question of the Establishment of Two Classes of Pharmacists and Corresponding Courses in Colleges of Pharmacy, Jacob Diner of New York, Chairman;

Committee to Work out Methods of Presenting the Advantages of Pharmacy as a Calling to High School Students, W. B. Day of Illinois, Chairman;

Joint Committee on Examination Questions, E. A. Ruddiman of Tennessee, Chairman;

Committee on Relation of the Colleges with the Boards, Charles E. Caspari of Missouri, Chairman.

All of these committee reports will be published in the Proceedings of the Conference and several of them will appear in other publications.

H. H. Rusby of New York read a paper on the Betterment of Salary Conditions in our Schools of Pharmacy, and, after discus-

sion, it was voted that the Executive Committee send copies of this paper to the administrative heads of all colleges of pharmacy with the request that steps be taken to secure additional funds so that the salaries paid to teachers in the pharmacy school can be materially increased.

W. H. Ziegler of South Carolina presented a paper on the teaching of pharmacodynamics and related subjects in pharmacy schools, which was thoroughly discussed by many of the delegates present.

It was voted to appoint a representative for the Conference on the newly organized pharmaceutical publicity committee, representing all the interests allied with pharmacy and to pay its share of the expenses of this Committee.

It was voted to accept the invitation for the Conference to be represented in the National Drug Trade Conference.

The following officers were elected for the ensuing year:

President: Wortley F. Rudd of Richmond, Va.

Vice-President: Julius A. Koch of Pittsburgh, Pa.

Secretary-Treasurer: Theodore J. Bradley of Boston, Mass.

Chairman of the Executive Committee: Henry Kraemer of Ann Arbor, Mich.

Members of the Executive Committee: Charles B. Jordan of Lafayette, Ind., Julius W. Sturmer of Philadelphia, Pa., Rufus A. Lyman of Lincoln, Neb.

Member of the Pharmaceutical Syllabus Committee, E. Fullerton Cook of Philadelphia, Pa.

THE DETECTION AND ESTIMATION OF COCAINE, HEROINE, AND VERONAL IN VISCERA.[1]

By P. A. Ellis Richards, F.I.C.

The viscera usually examined in cases of suspected narcotic poisoning are the liver, spleen, kidney, brain, stomach, and intestines, together with the contents of the last two, the urine, and, occasionally, the blood. In cases where a portion only of any organ, such as the liver, is submitted, the total weight of the latter should be ascertained from the pathologist carrying out the post-mortem examination, in order that in the event of a poison being found the

[1] Reprinted from *The Analyst*, June, 1919.

quantity present in the whole organ may be calculated. The same remark naturally applies to the urine when a portion only has been reserved for analysis.

The various organs and fluids are weighed, and the former reduced to a suitable state of subdivision. This is best effected, after a little preliminary dissection, by passing the material twice through a mincing machine, when aliquot portions can be taken for analysis. At this stage it should not be forgotten that, although medical evidence may have suggested death from a narcotic, the analyst in most cases must satisfy himself that no other poison is present.

A weighed portion of the material, acidulated with tartaric acid, should in the first place be distilled in a current of steam and the distillate reserved for examination with a view to the detection of volatile poisons—*e.g.*, chloral, chloroform, etc.

A further weighed quantity of viscera, rendered acid with acetic acid, is warmed with double its volume of alcohol (90 to 95 per cent.), allowed to stand for some hours, the alcohol decanted, and the residue again extracted with the same solvent. The various portions of alcohol are mixed and filtered through cloth, using the filter pump if necessary, concentrated, and again filtered—this time through paper. If the solution be still too deeply colored, lead acetate may be used as a clearing agent, the liquid being again raised to the boiling-point, filtered, and the lead removed by hydrogen sulphide. The filtrate, after concentration to small bulk at a low temperature, is reserved for the extraction of alkaloids, veronal, etc.

The urine, rendered faintly acid with acetic acid, is raised to the boiling-point, allowed to simmer, small portions of finely powdered lead acetate being added from time to time until precipitation ceases. After filtration and removal of the lead by hydrogen sulphide the liquid is concentrated to small bulk and reserved for examination as before.

Each of the various concentrations acidulated with acetic acid is extracted in a separate funnel with successive small quantities of ether. The various portions of solvent are mixed, the ether evaporated, the residue, if any, dried in the water-oven, weighed and examined for veronal, sulphonal, trional, etc.

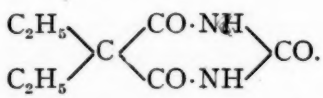
The aqueous solution, after the ethereal extraction just described, is rendered alkaline with ammonia and shaken with chloroform, this operation being repeated three times, the various portions of the

solvent mixed and shaken with two successive portions (10 Cc.) of $\frac{N}{10}$ hydrochloric acid. The aqueous solution, after rendering alkaline with ammonia, is reëxtracted with chloroform. The residue obtained after distilling off the chloroform may, where cocaine is suspected, be reëxtracted with benzene, in which this alkaloid is distinctly soluble.

The final residues obtained are dried, weighed, redissolved in suitable solvents, and aliquot portions evaporated in small flat-bottomed porcelain basins. One residue in each case is treated with a few drops of a 2 per cent. acetic acid solution and the special alkaloidal group-tests applied, the precipitates, if any, being reserved for microscopical examination and comparison with those obtained from known alkaloids.

The following notes on the identification of certain narcotics may be of interest:

Veronal (B.P. Barbitone, Diethyl barbituric acid).



This is a white crystalline substance with a slightly bitter taste, sparingly soluble in water (1 part in 150), and, when pure, has a melting-point of 191° C. After extraction from viscera the melting-point is frequently slightly lower, about 186° C. The medicinal dose given in the B.P. is 5 to 10 grains, whilst it is suggested by W. H. Willcox that 50 grains may be regarded as the minimum fatal dose for a healthy adult.

In cases of death from veronal poisoning the organs frequently contain a fair amount of the substance, and, as the latter is excreted by the kidneys, one usually finds a distinct proportion in the urine. Sometimes, however, a considerable period elapses between the taking of the fatal dose and the resulting death, and under such circumstances much of the drug may have been eliminated.

Veronal dissolves very rapidly in alkaline solutions and is easily extracted from an acid solution by means of ether. The crystalline character of the ethereal extract is to help in its detection, as also is the melting-point and the fact that it sublimes completely if carefully heated. The crystalline sublimate, if any, yielded by the extract may be compared microscopically with that obtained from

actual veronal. Confirmation of the presence of veronal may be obtained by adding a small portion of the extract to a little fused potassium hydroxide, when ammonia should be evolved and the residue yield effervescence of carbon dioxide and a curious fatty odour on treatment with dilute sulphuric acid. The Prussian-blue test with ferrous sulphate and the pink color with copper sulphate mentioned in the B.P. are not so satisfactory in toxicological tests. Millon's reagent (mercury dissolved in dilute nitric acid) gives a white gelatinous precipitate which dissolves in excess of the reagent.

Ammoniacal copper sulphate + veronal evaporated to dryness on a microscope slide gives pink to violet crystals that are fairly definite when compared with control slides (Tunmann, *Apoth. Zeit.*, 1917, 32, 289–299; and *Analyst*, 1918, 43, 67). I find that a solution of veronal in dilute ammonia, when evaporated, yields long crystals with serrated edges, markedly differing from those yielded by trional and sulphonal under the same conditions.

Sulphonal, $(CH_3)_2C(C_2H_5SO_2)_2$;

Trional, $CH_3C_2H_5C(C_2H_5SO_2)_2$;

Tetronal, $(C_2H_5)_2C(C_2H_5SO_2)_2$.

These are all white crystalline substances of similar type and reactions, and are much less toxic than veronal, being frequently employed as hypnotics. The B.P. gives the doses as from 10 to 20 grains for trional and tetronal, and from 10 to 30 grains for sulphonal, whilst considerably larger amounts would be required to produce fatal results.

They are best identified by their melting-points, these being: sulphonal, 125° C.; trional, 75° C.; and tetronal, 85° C. As a class these sulphones are sparingly soluble in water, but much more so in alcohol. When heated strongly they yield sulphur dioxide, with fused potassium cyanide they give an odor of mercaptan, whilst with fused sodium acetate they evolve hydrogen sulphide.

Heroine, di-acetyl morphine, $C_{21}N_{23}NO_5$, formed by the action of acetic anhydride on morphine.

Originally introduced as a substitute for morphine, is has recently gained notoriety on account of its use by certain drug-takers. The hydrochloride of the alkaloid is the form in which it is most frequently employed, and, like the corresponding cocaine salt, it is usually taken as a snuff. Consequently, where this poison or cocaine is suspected, swabs should be taken from the mucous membrane of

the nose, and submitted to chemical examination. One sixth of a grain is stated to have produced fatal results, and one thirtieth of a grain has produced dangerous symptoms.

A fatal case of poisoning, described by W. R. Boyd in the *Medical Journal* of Australia, is quoted in the *Lancet* of May 3 of this year. In this case, 6.97 grains of heroine were administered in mistake for veronal, death ensuing seventy hours later, only 1/64 grain of morphine being found in the organs.

Heroine hydrochloride is a white crystalline substance with a bitter taste, easily soluble in water, and having a melting-point of 230° C., differing in this respect from morphine hydrochloride, which chars without melting.

It resembles morphine in its reactions with Frohde's solution, ferric chloride, and also with iodic acid and starch, but the colours produced are slightly slower in appearing. A 2 per cent. solution of hexamethylene tetramine in strong sulphuric acid gives a fine purple color very slowly turning blue, but in this instance also a very similar reaction is yielded by morphine and its salts. The sodium phospho-molybdate precipitate dissolves in ammonia to a blue color practically identical with that given by salts of morphine under similar conditions.

Cocaine, $C_{17}H_{21}NO_4$.—The hydrochloride, the usual form in which this alkaloid is found in commerce, occurs in white prismatic crystals, strikingly soluble in water (2 in 1) with a melting-point of 186° C.

It is employed medicinally as a local anesthetic in minor operations of the eye, throat, and mouth, but it has recently come into prominence from its illegitimate employment as a snuff. Its physiological effect appears at first to be stimulating, but this is sooner or later followed by lassitude and, in excessive doses, by a state of coma. It causes dilatation of the pupil and usually disturbances of the nervous system. The body soon becomes tolerant to the drug, and, in the case of habitual takers, little or none may be found in the organs after death. In this respect it would appear to resemble morphine (*cf.* Webster, *Analyst,* 1917, 42, 226).

In addition to its distinctive melting-point of 98° C., this alkaloid is characterized by the following reactions:

It possesses a bitter taste followed by a somewhat prolonged numbness of the tongue. When evaporated to dryness with a few

drops of nitric acid, and the residue moistened with a little alcoholic solution of caustic potash, it yields the characteristic odor of benzoic ether (meadowsweet).

Pisani (*Rend. Soc. Chem. Ital.*, 1914, 6, 132) states that with a 2 per cent. solution of hexamethylene tetramine in strong sulphuric acid a wine-red color is produced, becoming more intense as the temperature rises. I am unable to confirm this, as, under the conditions specified, no reaction is obtained beyond a slight charring produced by the rise of temperature.

The resorcinol and strong sulphuric acid test proposed originally by M. Goeldner (*Zeitsch, anal, Chem.*, 1901, 40, 820) is quite fallacious, as shown by L. A. Ryan (*J. Amer. Chem. Soc.*, 1915, 37, 1960), the lavender-blue color supposed to be indicative of cocaine being caused by traces of nitrous or nitric acid in the sulphuric acid employed.

Cocaine gives with a permanganate solution, under certain conditions, distinct and characteristic crystals, but special precautions are needed to get a satisfactory result. The modification of the test proposed by E. H. Hankin (*Analyst*, 1911, 36, 2), where the alkaloid is dissolved in a saturated alum solution and added to a dried film of potassium permanganate on a microscope slide, gives excellent results and the crystals are quite definite. The concentration of cocaine in the alum solution should not be less than 1 part in 10,000.

Although the salts of many alkaloids yield a precipitate with potassium chromate, cocaine hydrochloride gives no precipitate until after the addition of a few drops of concentrated hydrochloric acid. Morphine and heroine give no reaction with potassium chromate solution in either neutral or acid solution.

Wagner's solution (iodine in potassium iodide) throws down a brownish-red precipitate with salts of this alkaloid that appear as dark brown oily drops when examined microscopically. The same result was obtained with this reagent when cocaine hydrochloride was dissolved in saturated alum. Sodium phospho-molybdate gives a curdy yellowish-white precipitate soluble in ammonia to a very pale bluish-green solution.

ESTIMATION OF SMALL QUANTITIES OF LEAD IN FOOD AND SUBSTANCES CONTAINING CALCIUM PHOSPHATE.[1]

By B. W. J. Warren, F.I.C.

In the B.P. method for the estimation of lead, the substance to be tested is dissolved either in water or a dilute solution of ammonia.

With foods it is necessary to first destroy the organic matter and estimate the lead in the ash. The ash can be dissolved in dilute nitric acid, and the solution rendered alkaline with ammonia, a precipitate of calcium and magnesium phosphate being obtained. If the filtrate is used for the estimation of lead (using the B.P. method) considerable quantities of lead may sometimes be overlooked, as the lead is occluded with the precipitated phosphates (or as an insoluble double phosphate of calcium and lead).

Wilkie (*J. Soc. Chem. Ind.*, 1909, 28, 636) has pointed out that ferric hydroxide will remove lead from a tartrate solution.

If calcium phosphate containing traces of lead and copper is dissolved in dilute nitric acid and ammonia be added the precipitate contains all the lead, while the copper is in solution. If this precipitated phosphate (containing lead) is dissolved in dilute nitric acid the lead can be estimated colorimetrically.

In the absence of iron, lead and copper can be easily and accurately estimated in a food. Iron, however, presents some little difficulty: if a phosphate precipitate containing lead and iron (copper being eliminated as shown above) is dissolved in dilute acetic acid the solution is turbid owing to the presence of phosphate of iron. If this precipitate is filtered off some of the lead is removed with the precipitate (with the material with which I was working about two thirds were removed).

It is, however, possible to match the color with the slightly turbid solution and thus estimate the lead.

The method adopted is as follows:

Ten Grms. of foodstuff are incinerated in a silica dish, dissolved in a small quantity of water with the addition of 1 Cc. of nitric acid, filtered, and washed. To the filtrate, which should be colorless, a slight excess of ammonia is added, the precipitate filtered and

[1] Reprinted from *The Analyst*, June, 1919.

washed well. (The filtrate can be tested for lead by B.P. method.) The copper will be in the solution, while the lead (most, if not all) will be in the precipitate.

The precipitate is washed into a Nessler cylinder with water, 5 Cc. of dilute acetic acid are added, followed by an aqueous solution of hydrogen sulphide, and the color matched in the usual manner.

The control solution is prepared as follows:

A quantity of dilute lead solution (B.P.) diluted with water is rendered faintly alkaline with ammonia, and to this is added 5 Cc. dilute acetic acid and finally hydrogen sulphide solution.

The following results were obtained by the above method on samples prepared by adding lead to a food containing copper and iron:

Lead Added.	Lead Found.
10 parts per million.....	8, 9 parts
20 " " "	20, 16 "

SUTTON ROAD, SOUTHEND.

ESTIMATION OF MONOBROMATED CAMPHOR IN MIGRAINE TABLETS.[1]

BY W. O. EMERY.

INTRODUCTION.

The estimation of monobromated camphor *per se* by means of its bromine content may be effected with greater or less facility by any one of several procedures, notably the classic one of Carius; more speedily, however, by that of Stepanoff[2] which involves reduction in absolute alcohol with sodium, or by modifications thereof as reported by Bacon,[3] Maryott,[4] and Drogin and Rosanoff.[5] The earliest recorded experiments dealing specifically with the quantitative elimination of the halogen in monobromated camphor were undertaken

[1] Reprinted from *The Journal of Industrial and Engineering Chemistry*, August, 1919.

[2] *Ber.*, 39 (1906), 4056.

[3] *J. Am. Chem. Soc.*, 31 (1909), 49.

[4] *Am. J. Sci.*, 30 (1910), 378; *Chem. News*, 103 (1911) 1.

[5] *J. Am. Chem. Soc.*, 38 (1916), 711.

by Schiff,[6] who, operating with sodium on a solution of the camphor derivative in toluene, showed the result of such action to be sodium bromide and sodium camphor. Taking advantage of this observation and subjecting the resulting products to titration *via* Volhard, Andre and Leulier[7] report satisfactory results in the examination of several commerical samples of the drug.

In medicaments like migraine tablets, however, the problem of evaluating the camphor derivative becomes more complicated. In addition to vehicular and other more or less inert materials peculiar to such products, we have here a preparation consisting essentially of acetanilide, caffeine, and monobromated camphor, with sometimes salicylates and plant extractives. From mixtures of this character monobromated camphor, on account of its physical properties, is hardly susceptible of quantitative isolation by means of immiscible solvents, although a gross separation of the drug in solution, along with acetanilide, caffeine, and other extractable material eventually present, may indeed be made by a systematic treatment of the powdered tablets with alcohol, benzene, or toluene. Such procedure, however, almost invariably gives rise to solutions of so unwieldy and varying a volume as to render any subsequent reduction, with sodium for example, quite valueless, owing to the uncertain quantity of metal required and consequent unsatisfactory results. Even when operating with like volumes of solvent, and in strict accord with the latest approved method comprehending the Stepanoff principle,[8] the amount of sodium required for complete reduction is generally variable and always relatively large, in fact, more than twenty times that of the bromine derivative involved. This comparatively low efficiency from the standpoint of sodium consumption arises from the phenomenon, familiar to most chemists, whereby metallic sodium when applied to heated alcohol immediately assumes the spheroidal state, moving about very actively on the surface of the liquid, but separated therefrom by a film or cushion of hydrogen and alcohol vapor, all conditions clearly favoring incomplete reduction. Any objection to, or uncertainty attendant upon, the use of the free metal may be entirely eliminated by recourse to the procedure whereby the powdered tablet itself in alcoholic solution and suspension is subjected to the action of sodium in the form of its mercury

[6] *Ber.*, 13 (1880), 1407.
[7] *J. pharm. chim.*, [7] 2 (1910), 64.
[8] *Loc. cit.*

amalgam, an effective reagent and at all times under complete control of the operator.

Experimental.

The tabulated data are representative of numerous results obtained with both control and commercial mixtures. The monobromated camphor required for the controls was prepared by recrystallization of a well-known foreign brand carrying a slight excess of halogen. The purified product melted sharply at 76° and had a bromine content, as determined by Carius, of 34.6 per cent. In general, the treatment consisted in subjecting the powdered sample in alcoholic solution and suspension to the action of the amalgam at about the temperature of boiling alcohol, at first over a wire gauze and with appropriate reflux, finally on the steam bath to practical exhaustion of the amalgam, and with no attempt at condensation. The amalgam was applied in a strength of about 1 per cent. of sodium, although in Expts. 5 to 8, inclusive (see table), a product containing only 0.6 per cent. of sodium was employed. After quantitative separation of the liquid from the mercury, the halogen is precipitated by silver nitrate in acidified solution, and the insoluble bromide determined in the usual way. In general, estimation of the bromine *via* Volhard is not advocated, on account of possible interference from accompanying organic substances.

Experiment No.	$C_{10}H_{15}BrO$ Gram.	PhNHAc Gram.	Caffeine Gram.	Starch Gram.	NaHg Gram.	AgBr Gram.	$C_{10}H_{15}BrO$ Calcd. G.	$C_{10}H_{15}BrO$ Calcd. Per Cent.
1	0.2000	....	....	....	25	0.1621	0.1994	99.7
2	0.1000	....	....	....	25	0.0810	0.0996	99.6
3	0.2000	....	....	....	25	0.1628	0.2002	100.1
4	0.1000	....	....	....	25	0.0809	0.0995	99.5
5	0.2000	....	....	....	25	0.1619	0.1991	99.6
6	0.2000	....	....	....	20	0.1617	0.1989	99.5
7	0.2000	....	....	....	15	0.1596	0.1963	98.2
8	0.2000	....	....	....	10	0.1526	0.1877	93.8
9	0.2000	....	....	....	15	6.1623	0.1996	99.8
10	0.2000	....	....	....	10	0.1622	0.1995	99.8
11	0.2000	0.8000	0.1000	0.1000	25	0.1627	0.2001	100.1
12	0.1000	0.4000	0.0500	0.0500	25	0.0812	0.0998	99.8
13	0.0972(?)	0.3888	0.0486	?	25	0.0762	0.0937	96.4(?)
14	0.0972(?)	0.3888	0.0486	?	25	0.0768	0.0945	97.2(?)
15	0.1000	0.4000	0.0500	0.2000	25	0.0812	0.0999	99.9
16	0.1296(?)	0.1944	0.0648	?	25	0.1052	0.1294	99.8(?)
17	0.1296(?)	0.1944	0.0648	?	25	0.1056	0.1299	100.2(?)
18	0.1300	0.2000	0.0650	0.1000	25	0.1059	0.1303	100.2
19	0.1296(?)	0.6480	....	?	25	0.1068	0.1314	101.3(?)
20	0.1296(?)	0.6480	....	?	25	0.1065	0.1310	101.1(?)
21	0.1300	0.6500	....	0.1000	25	6.1056	0.1299	99.9

In further explanation of these results, it may be stated that Expts. 1 to 10, inclusive, have to do primarily with the camphor derivative alone, 13 and 14, 16 and 17, and 19 and 20 with commercial mixtures, while 11 and 12, 15, 18, and 21 deal essentially with controls of the latter, in which the dominating ingredients were proportioned to agree with the manufacturer's label. Accordingly, any uncertainty existing relative to the quantities of such ingredients, notably monobromated camphor, actually introduced or present in the samples examined, would necessarily be reflected in all computations based thereon—as in the calculation of percentages—and is so indicated. With the exception of Expts. 3 and 4, the period of reduction in all the experiments was uniform, consisting of a ½ hr. treatment under reflux on the wire gauze and 1 hr. on the steam bath. In the exceptions noted, the reflux period was doubled, thus making the entire digestion cover a 2 instead of 1½ hrs. While no material advantage in the longer treatment is observable there can be no objection thereto. A brief survey of the results presented will suffice to show the efficacy of the method.

Method.

Ascertain the weight of 20 or more tablets, reduce to a fine powder and keep in a small tube or specimen bottle provided with a tightly fitting cork or glass stopper. On a metal or glass scoop weigh out an amount of the sample equivalent to not less than 100 or more than 200 Mg. of the camphor derivative alleged to be present. Transfer quantitatively with 20 Cc. of 96 per cent. alcohol and 10 Cc. of water, to a small (100 Cc.) round-bottomed flask, containing 15 G. of 1 per cent. sodium amalgam. Connect the flask, by means of a rubber stopper, with a short vertical reflux, preferably of the Allihn or of the worm type. Heat the mixture over a wire gauze just enough to cause the liquid to boil gently for a period of not less than 30 Min. After cooling slightly, wash out the condenser tube first with 5 Cc. of alcohol, then with 5 Cc. of water, receiving the washings in the flask below. Remove the flask to the steam bath, heating for another hour, or until the evolution of hydrogen has nearly or quite ceased. Toward the latter part of this operation, render the liquid about neutral with a few drops of acetic acid in order to further reduction. Transfer the contents of the flask to a separatory funnel, preferably of the Squibb type, withdrawing and

washing the mercury in a second separatory funnel with at least two 50 Cc. portions of water. Pass the several aqueous solutions quantitatively through a small filter, collecting the clear filtrate in a suitable beaker. Precipitate with silver nitrate after the addition of about 5 Cc. of nitric caid, and proceed in the usual gravimetric way, employing, if available, a Gooch crucible in the operation of filtering. The weight of the silver bromide multiplied by the factor 1.23 will give the quantity of monobromated camphor originally present in the sample taken for analysis. A control should be run on the amalgam in order to determine whether any correction is necessary for the presence of halogen in material quantity.

SUMMARY.

This method for the estimation of monobromated camphor in migraine tablets takes advantage of the fact that, when an aqueous-alcoholic solution of the camphor derivative, either alone or in admixture with other substances, is subjected to the action of sodium amalgam on heating, among other changes the bromine is split off quantitatively in the form of its sodium salt, which may then be determined gravimetrically in the usual way.

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ANTISCORBUTICS. II.[1]

In a previous issue of THE JOURNAL,[2] reference was made to some of the experiences which have led to the development of diverse sorts of antiscorbutic products available for the purposes of infant nutrition. It is not necessary to refer back to the older expeditions in search of the North Pole or to the experiences of our Civil War to learn how essential antiscorbutic foods may be to an adult as well as to the growing infant. The changes in our food supplies have altered the dietary habits of mankind,[3] and, although in normal peace times the tendency toward a liberal supply of varied

[1] From *The Jour. of Amer. Med. Asso.*, August 2, 1919.

[2] Antiscorbutics," I, editorial, J. A. M. A., 73: 271 (July 26), 1919.

[3] Mendel, L. B., "Changes in the Food Supply and Their Relation to Nutrition," Yale University Press, 1916.

foods is likely to avert widespread deficiencies of essential factors, this is far from being the case under war-time conditions. Scurvy made its appearance in Europe among troops and civilians when the exigencies of the situation in which they were inadvertently placed compelled them to subsist on unsuitable foods. This does not necessarily mean that the energy furnished was insufficient, or that the protein was inadequate; but it has shown that even in the midst of plenty the quality of our foods may be dangerously defective.

The knowledge that heat may affect the stability of vitamins and more particularly the antiscorbutic property of foods has focused attention on the effects of cookery, canning and various other modes of food preparation and preservation on the integrity of the accessory food factors. We shall not claim the ability to render a final judgment as to either the safety or the nocuousness of any of the varied methods of conservation. A few references to the outstanding facts ought, however, to serve as an indication of the great uncertainties which have been raised, and the probable considerable significance of the questions at issue for practical dietetics. The keynote was sounded by Holst seven years ago. The striking demonstration of the loss of antiscorbutic potency as the result of desiccation and cooking furnished by Givens and Cohen[4] of Yale with regard to cabbage and potatoes has been substantiated at the Lister Institute in London.[5] We are told that, so far as animal experiments can be depended on to furnish evidence, there is a loss in antiscorbutic properties of more than 93 per cent. when cabbage is dried at a low temperature and stored subsequently from two to three weeks at laboratory temperature. After drying and storing from five to six weeks at laboratory temperature, a further loss of antiscorbutic properties is suffered. After storage for three months, nearly all the protective value of the fresh material is lost (about 96 or 97 per cent.). The fact that less loss through desiccation takes place if the product is first steamed or plunged into boiling water suggests at once that something other than mere heating or desicca-

[4] Givens, M. H., and Cohen, B., "The Antiscorbutic Property of Desiccated and Cooked Vegetables," *J. Biol. Chem.*, 36: 127 (Oct.), 1918.

[5] Delf, Ellen Marion, "The Antiscorbutic Value of Cabbage, I, The Antiscorbutic and Growth Promoting Properties of Raw and Heated Cabbage," *Biochem. J.*, 12: 416 (Dec.), 1918. Delf, Ellen Marion, and Skelton, Ruth Filby, "The Antiscorbutic Value of Cabbage, II, The Effects of Drying on the Antiscorbutic and Growth Producing Properties of Cabbage," *ibid.*, page 448.

tion is concerned in the deteriorating influences of these preservation processes.

From the standpoint of culinary food preparation, Delf[5] suggests that these facts have some bearing on methods of cooking green vegetables, and indicate broadly that the least loss of antiscorbutic properties will be obtained by cooking green vegetables for a short time at a higher temperature rather than for a longer time at a lower temperature. Hess and Unger[6] have lately reported that carrots lose much or all of their antiscorbutic potency through cooking. They have, furthermore, called attention to the added factor of the maturity of the plant. As they express it, from a nutritional standpoint carrots cannot be looked on as a uniform article of diet. There is a marked difference in various lots of carrots, and probably also of other vegetables, according to whether they are fresh and young, or are old. It was found, for example, that if, instead of employing the carrots which were ordinarily fed to their laboratory animals, they gave the same amount of fresh young carrots, plucked only a few days previously and cooked, not only did the animals not develop scurvy, but they gained steadily in weight for a long period.

Hess and Unger[6] remark that the freshness and age of the vegetables sufficed also to enable them to retain their antiscorbutic potency after dehydration. This is a statement of considerable importance because it points to a further variable that may need to be considered in evaluating food preparations from the standpoint of their antiscorbutic effects. If, to the problem of the effect of heat, oxidation, preliminary treatment and age of the fresh product, there is added the question as to the possible influence of different reactions of acid and alkali as they occur naturally in foods or are added incidental to their manipulation—the complexity of the project of retaining the antiscorbutic potency becomes more apparent.

This is a time for cultivating the "open mind" in reference to the true nutritive value of conserved foods. If some desiccated vegetables have proved to be devoid of antiscorbutic efficiency, it must, nevertheless, be admitted that the loss can probably be averted entirely or partially when the conditions which determine it are definitely ascertained. Fruit juices have already been concentrated, and tomatoes have already been dehydrated without becoming im-

[6] Hess, A. F., and Unger, L. J., "The Scurvy of Guinea-Pigs, III, The Effect of Age, Heat and Reaction on Antiscorbutic Foods," *J. Biol. Chem.*, 38: 293 (June), 1919.

potent in respect to the factor under discussion. Hess and Unger assure us that it would be an error to infer from such experiments as are now on record that milk necessarily loses its antiscorbutic potency when it is reduced to a dry state. Enough specific instances of contradictory facts are on record to warn us, on the one hand, against condemning canned goods or dehydrated vegetables of their analogues from the standpoint of their vitamin potency; or of praising any of them without specific information as to each product. The offhand statements which are beginning to emanate from partisan or inadequately informed sources must not be accepted. The time is not yet ripe for "expert opinions" that are all comprehensive in their information. Knowledge in relation to vitamins is in the making. Fortunately, at the point where chemical analysis utterly fails, the physiologic experiment is proving to be a dependable guide. Let us get the facts first of all.

PHARMACY IN THE BELGIAN ARMY.[1]

The medical service of the Belgian Army is very far from being a concrete body of officers and men—like our Royal Army Medical Corps—charged with doing anything and everything for the wounded or sick soldier anywhere or at any time. The *Corps de Santé Militaire* includes medical officers, pharmacists, and veterinary officers. The Medical Service consists of the medical and pharmaceutical officers of this corps plus the hospital section of the *Bataillon d'Administration.*

Rank and Titles.

In the Belgian Army the position of doctors and pharmacists is very similar to the status they hold in the French Army. Neither medical nor pharmaceutical officers have military titles, and, in consequence, they have not the standing in their Army which long experience has proved in our own and other armies can alone be secured by a military title. The following are the titles held by medical officers in Belgium:

Médecin Inspecteur-General, ranking with major-general.
Médecin Principal de 1re Classe, ranking with colonel.

[1] From *The Chemist and Druggist,* August 30, 1919.

Médecin Principal de 2me Classe, ranking with lieut.-colonel.
Médecin de regiment de 1re Classe, ranking with major.
Médecin de regiment de 2me Classe, ranking with captain.
Médecin de bataillon de 1re Classe, ranking with lieutenant.
Médecin Adjoint de 1re Classe and Médecin Adjoint de 2me Classe, both ranking with second-lieutenant.

Readers of my article on "Pharmacy in the French Army" (*C. and D.,* June 7, p. 50) will note that the historic title of the French *Médecin, viz.,* "major," is not used in Belgium. The rank of "major" does not exist in the French Army. The corresponding rank is, of course, *Commandant*; but the term *Monsieur le Major* is universally employed by the French *poilu* in addressing his medical officer. The title is obviously a contraction of the cumbrous French medico-military titles of *Médecin Major* and *Médecin Aide Major,* but takes some getting used to in one's earlier days with a French military formation. During the war it was sometimes replaced by a word of *argot* (*Tout-bib*), as the chief amusement of the *poilus* in the trenches was to invent new words and phrases of *argot.*

Ranks and Titles of Pharmacists.

There are seven grades of pharmacist in the Belgian Army, *viz.:*
Pharmacien en Chef, ranking with lieutenant-colonel.
Pharmacien Principal, ranking as major.
Deuxième Pharmacien de 1re et 2me Classe, both ranking as captain.
Pharmacien de 3me Classe, ranking as lieutenant.
Pharmacien de 4me Classe and *Pharmacien Adjoint,* both ranking as second lieutenant.

The proportion of pharmacist to medical officers is about one to four.

Pay.

The rates of pay drawn by pharmacist officers is, as in the Italian Army (*C. and D.,* June 14, p. 64), the pay of their relative rank, as all branches of the service are paid at the same rates. A *Pharmacien en Chef* draws only 280 *l.* per annum, a *Pharmacien Principal* 252 *l.*, *Pharmacien de 1re et 2me Classe* from 168 *l.* to 204 *l.*, *Pharmacien de 3me Classe* 130 *l.* It will be seen that some pharmacists, with merely non-commissioned rank, in our Army are better off financially than their commissioned Belgian *confrères.*

Recruitment of the Medical Service.

There is nothing corresponding to the Royal Army Medical College or the *Val de Grâce* in Belgium, and our R. A. M. C. is replaced by a portion of what is called the *Bataillon d'Administration.* This administration includes all the administrative service, and three sections of it are known collectively as *Le Service de Secours de l'Armée.* One of these sections is the *Section des Hopitaux,* and the other two correspond to our Royal Army Veterinary Corps and the Royal Chaplains Department. The *Section des Hopitaux* is divided into *personnel d'ordre* or permanent administrative officials and *personnel technique* or executive *personnel,* which may be what we would call "regular" or on the reserve. A student of pharmacy or a qualified *Pharmacien* enters the Medical Service by enlisting in the *Section des Hopitaux,* in which he is graded according to his professional standing. Junior students of pharmacy are graded as *Pharmaciens Aspirants,* and senior students and graduates in pharmacy as *Pharmaciens Auxiliaires.* Both wear the uniform of a *Pharmacien Adjoint,* but without embroidery, lace, or stars. They go through a course of instruction, under a regular pharmaceutical officer, but receive no pay unless they are mobilized or specially employed. *Pharmaciens Auxiliaries* who wish to obtain commissions as *Pharmaciens Adjoints* must pass a special examination when they are graded as *Pharmaciens Suppléants.* Vacancies in the rank of *Pharmacien Adjoint* are filled up from among the *Pharmaciens Suppléants,* who must have graduated in pharmacy at one of the universities. Instead of proceeding to a permanent commission in the Army, a *Pharmacien Suppléant* may pass to the reserve by applying for congé illimité, or permanent leave. The bulk of the leading pahrmacists of Belgium were, before the war, *Pharmaciens Suppléants* on permanent leave.

Pharmaceutical Rank and File.

The pharmacy and laboratory attendants of the service are also recruited from the *Bataillon d'Administration.* Together with the nursing orderlies, they form a small part of the staff of a Belgian military hospital, as the bulk of the administrative work is in the hands of non-medical officers. The management of the hospital is quite distinct from the actual care and treatment of the sick. Not even the medical records of the formation are kept by medical per-

sonnel. The medical officer in charge demands such clothing, bedding, and diets as he may require, and what corresponds to a Royal Army Service Corps officer, or subordinate, furnishes him with his requirements and looks after the furnishing, lighting and cleanliness of every part of the hospital except the actual wards. This system of dual control is in sharp contrast to the arrangements of our own Army, where the R. A. M. C. officer in command is responsible for every detail of its organization, and where practically all the work of the unit is carried out by medical *personnel.* In order to understand how the pharmacist officer fits into the Belgian fighting machine it is necessary, as in the case of the French and Italian armies, briefly to glance at the field medical organization of the Army. The organization corresponds very closely to that of the French, but the formations have different names. It comprises the following:

1. The Regimental Medical Service.

2. *Les Colonnes d'Ambulance,* corresponding to the French Army.

3. *Les Hopitaux Volants,* corresponding to the French ambulances.

Later in the war the official title was dropped, and the term *ambulance* adopted. The Regimental Medical Service is organized on French lines, and each regiment has a little medical hierarchy of its own, directly under the *Colonel du régiment,* as in the French system, but there was a tendency to attach *Pharmaciens* to regiments, as a feature of the Belgian Service is the establishment of *Infirmeries du régiment* for the treatment of trivial cases. One point about all these little regimental hospitals was, throughout the war, a well-equipped and well-organized pharmacy. The *Colonne d'Ambulance* functions exactly like the French *Groupes des Brancardiers Divisionnaires* or the Bearer-Division of a British Field Ambulance. There is a *Pharmacien* and a *Pharmacien Adjoint* with each unit and, in addition to pharmaceutical duties, the pharmacist officers function as analysts and gas officers in the same manner as their *confrères* in the French *Service de Santé.*

The Field Hospitals.

The *Hoptiaux Volants* in the Belgian Army have each got a *Pharmacien* officer, and usually two *Pharmaciens Suppléants.* As

already pointed out, these formations are identical with the French Ambulances and, as in the French Army, there are two with each division.

For the pharmaceutical administration in the field, the Director of Medical Services of a Belgian Army has one *Pharmacien Principal* and one *Pharmacien Suppléant* on his staff. The *Pharmacien Principal* of the Army is responsible to the director for the organization of pharmaceutical services, laboratories, and medical stores throughout the Army area. He carries out inspections on the part of his chief and functions in every way as a senior staff officer at the Army headquarters. The *Pharmacien Suppléant* acts as staff officer to his chief and carries on the duties of the pharmaceutical section of the director's office during the absence on duty of the *Pharmacien Principal.* All base and advanced depots of medical stores are in the charge of *Pharmaciens.* Indeed the British Army is the only European Army in which the care of medical and surgical material is not in the hands of trained pharmacist officers.

The Red Cross.

As in most other Continental countries, the Red Cross Society of Belgium is very highly organized, and employs a large number of pharmacists. The society is under a Committee of Direction, appointed by the King, and works in conjunction with the Belgian War Office. Under certain conditions, laid down by the military authorities, a pharmacist can complete the bulk of his military service under the Red Cross. The peace activities of the Belgian Red Cross were not at all comparable with those of other Allied Red Cross Societies such as the *Croce Rossa Italiana.* The society provides the personnel for ambulance trains and railway rest stations, and organizes auxiliary military hospitals of various kinds.

It will be seen that the pharmaceutical service of the little Belgian Army presents some interesting characteristics; that pharmacy holds the status of a profession and its practitioners who are granted commissioned rank hold responsible posts as officers on the staff. (*M. D., L. P. S. I.,* 87, 1919.)

AN EXPERIMENTAL STUDY OF STROPHANTHUS KOMBÉ SEEDS.[1]

By Karam Samaan, M.Sc.

Part I.

This experimental study of Strophanthus Kombé seeds was carried out with the object of finding out (*a*) The activity or otherwise of the oil present in the seeds; and (*b*) the existence or non-existence in the de-fatted seeds of a physiologically active body beside the water-soluble strophanthin.

A special feature of this investigation is the pains which were taken to ensure absolute purity and freedom from water of the solvents used and the thorough drying of the seeds. The various solvents used—petroleum ether, ether, ethyl alcohol, methyl alcohol, amyl alcohol, and chloroform—were subjected, in the laboratory, to lengthy purification processes and thorough drying.

The seeds were dried in an oven—fitted with a thermostat and the temperature adjusted at 40–50° C.—for four successive days of eight hours each. The total loss of weight reckoned as moisture was 6.85 per cent. of the original seeds.

The dried seeds were de-fatted by means of purified and dried petroleum ether b.p. 50–70° C. The amount of oil isolated was 31.55 per cent. of the original seeds. This oil was found to possess no marked physiological action. This was established by (*a*) injecting and feeding frogs with a preparation of the oil, or the oil itself; and (*b*) perfusing a weak emulsion of the oil through the frog's heart. Great care was also taken to ensure uniformity of conditions in the physiological experiments carried out.

It was noticed that on shaking the oil with water and leaving it for a time a yellowish white solid body—probably resinous in nature—separated from the oil. The layer of oil became less viscid and more transparent than the original sample. The isolated resin-like body was found to be soluble in ether, petroleum ether, alcohol, and chloroform. It was precipitated from alcoholic and ethereal solutions by excess of water containing 1 per cent. hydrochloric acid.

Since the oil before separation of this resin-like body was found to be inactive, no attempt was made to examine the latter.

[1] Reprinted from *The Pharmaceutical Journal and Pharmacist*, July 26, 1919.

SUMMARY OF RESULTS.

No. of Experiment.	Weight of De-fatted Strophanthus Seeds Exhausted	Volume of Solvent Used.	Period of Exhaustion (16 Hours' Maceration and 8 Hours' Continuous Exhaustion a Day).	Taste of the Seeds After Exhaustion.	Weight of Dry Residue Obtained After Evaporation of the Solvent.	Chemical Tests made on the Residue.	Residue Tested Physiologically.
1	30 gms.	800 cc. water.	6 days.	Tasteless.	6.87 gms.	Positive.	Active.*
2	30 gms.	800 cc. absolute alcohol.	13 days.	Bitter.	3.75 gms.	Positive.	Active.*
3	30 gms.	800 cc. amyl alcohol.	13 days.	Bitter.	3.85 gms.	Positive.	Active.*
4	30 gms.	800 cc. methyl alcohol.	10 days.	Tasteless.	5.95 6ms.	Positive.	Active.*
5	30 gms.	800 cc. chloroform.	13 days.	Very bitter.	2.84 gms.	Faintly positive	Slightly active.*

* The physiological action of these residues was practically identical within limits. In brief, it consisted in slowing the heart, prolonging the period of systole, and in being non-cumulative. This was established by perfusing solutions of these residues through the exposed heart of a pithed frog and tracing the heart beats on smoked paper on a revolving drum.

The seeds that were exhausted with water, exp. I, were dried and then exhausted with absolute alcohol. The residue obtained after evaporation of the absolute alcohol was found to be inactive, thus showing that absolute alcohol does not remove any physiologically active body from the seeds which were previously exhausted with water.

The aqueous residue obtained as in exp. I was exhausted with amyl alcohol. The amyl alcohol removed the bitter principle and left a tasteless residue which was found to be physiologically inactive. The chemical tests made on this residue were negative.

The absolute alcohol residue obtained as in exp. II, the amyl alcohol residue obtained as in exp. III, the methyl alcohol residue obtained as in exp. IV, the chloroform residue obtained as in exp. V, were each exhausted with water. The water removed all the bitter principle and left a tasteless residue which in each case was found to be physiologically inactive, and whose chemical tests were negative.

The seeds de-fatted with petroleum ether were then exhausted with ether, yielding 0.415 per cent. residue, which was found to be physiologically inactive.

One may conclude, therefore, that the activity of the oil and the ether extract obtained by some previous investigators was probably due to the seeds and solvents not having been well dried.

The de-fatted seeds, obtained as above by treatment with petroleum ether and ether, were exhausted with various solvents, and the activity of the residue left after evaporation of the solvent determined physiologically and chemically in each case.

Exhaustion was carried out by means of a Soxhlet apparatus and under reduced pressure, so that the temperature did not exceed 60° C., so as not to cause decomposition of a physiologically active body. This was more necessary as the seeds were not readily exhausted of their bitter principle—even water (the best solvent) requiring a period of six days, during which two processes alternated —(*a*) continuous exhaustion for eight hours, followed by (*b*) sixteen hours of simple maceration.

In brief the above work may elucidate the following points:

1. The oil of Strophanthus Kombé seeds isolated by dry petroleum ether is inactive.

2. The ethereal residue is inactive.

3. The poisonous property of the seeds is due to a water-soluble glucoside or glucosides.

4. No active principle other than the water-soluble body was removed by any of the solvents employed.

5. Water completely removes the active principle from the seeds.

6. Methyl alcohol comes next to water in being a good solvent for the active principle.

7. Neither absolute alcohol nor amyl alcohol did completely remove the bitter principle from the seeds—probably due to the coagulation of the proteid substances, and thus prevent thorough contact of solvent and solute.

8. Amyl alcohol completely removes the bitter principle from the aqueous residue but not from the seeds.

9. Chloroform is a very poor solvent for the active principle.

10. The water-soluble glucoside or glucosides slow the heart, prolong the period of systole, and are non-cumulative.

The chemical tests utilized in the above table are: (1) The sulphuric acid (80 per cent.) test; (2) the ferric chloride and sulphuric

acid test; (3) the sulphuric acid and potassium dichromate test; (4) the phosphomolybdic acid test; (5) Keller-Kiliani's test; (6) Kiliani's reagent; (7) Keller's test; (8) the tannic acid test; and (9) a new delicate test which is as follows: Sulphuric acid concentrated (2 drops) and ammonium molybdate (0.10 Gm.) on a slab gave with a trace of strophanthin—or residue containing strophanthin—a light brownish green color which gradually developed into blue after ten minutes. The intensity of the blue color reached a maximum in twenty minutes, and remained permanent. This intense blue color was instantaneously destroyed by a trace of concentrated nitric acid. This test is based on the reducing power of the glucose portion of the strophanthin molecule, and, therefore, this test would be positive with other active principles of a reducing nature.

This test may be used as a comparative test for different varieties of strophanthus seeds.

Several active principles, particularly the glucosides, were tested with this test.

Some of these results may be interesting in connection with strophanthin:

Digitalin (verum)—Garnet red at once, going to deep blue in a minute.

Digitalein (Merck)—Orange at once, going to orange red in two minutes, then deep blue in twenty minutes.

Digitoxin (Merck)—Olive green at once, going to dirty black in a minute, then changing to deep blue.

Digitalin pur. (Merck)—Orange at once, going to violet in half a minute, and gradually to blue in five minutes.

Digitonin (Schuchardt)—Nothing at first; blue color appears in two minutes, reaching a maximum in eight minutes.

Salicin—Violet immediately, going to blue in eight minutes.

Santonin—Light blue, deepening on keeping.

Part II.

The determination of the M.L.D. of

(I) K. Strophanthin isolated in the laboratory.

(II) Strophanthin Merck, and

(III) Tincture of Strophanthus B.P., 1914.

English frogs were chosen for these experiments, and the usual

methods of M.L.D. determinations were adopted. The following are the final conclusions drawn from 59 experiments:

M.L.D. by intralymphatic injection for each kilogram of body weight of frog:

0.00104 Gm. of K. Strophanthin isolated in the laboratory.
0.00107 Gm. of Strophanthin Merck.
1 Cc. of Tincture of Strophanthin B.P.

Oral M.L.D. for each kilogram of body weight of frog:

0.02 Gm. of K. Strophanthin isolated in the laboratory.
0.0208 Gm. of Strophanthin Merck.
20.40 Cc. of Tincture of Strophanthus B.P.

From these results one may conclude that:

(1) For a frog the oral M.L.D. is about twenty times more than the M.L.D. given by intralymphatic injection.

(2) The toxicity of K. Strophanthin (isolated in the laboratory) is practically identical with that of Strophanthin Merck.

Part III.

The same B.P. Tincture of Strophanthus whose M.L.D. was determined in Part II. was assayed by the following methods and gave the following results:

(i) 0.082 per cent. of Strophanthin in the tincture as assayed by Elborne's method ("Year-Book of Pharmacy," 1887, 423).
(ii) 0.086 per cent. of Strophanthin in the tincture as assayed by Fraser's method (*P.J.*, 1889, 332).
(iii) 0.097 per cent. of Strophanthin in the tincture as assayed by Barclay's method (*P.J.*, Nov. 28, 1896, 463).
(iv) 0.102 per cent. of Strophanthin in the tincture as assayed by Fromme's 1910 method (*E. Ph.*, vol. II., 1915, p. 129).
(v) 0.101 per cent. of Strophanthin in the tincture as assayed by Lampart and Mueller's method (*A. Pharm.*, ccli., 609).
(vi) 0.104 per cent. of Strophanthin in the tincture physiologically assayed.

The above results show that Barclay's, Fromme's 1910, and Lampart and Mueller's methods agree—within limits—with the physiological standardization and are, therefore, satisfactory.

It was noted that it would be preferable to use a perforator—instead of shaking out in a separating funnel—in removing the strophanthidin by chloroform, as this would minimize the amount of

chloroform used and assure complete removal of the strophanthidin. The same B.P. tincture assayed by Barclay's method and using the perforator gave 0.099 per cent. of strophanthin.

In assaying the seeds by Fromme's and Lampart and Mueller's methods, I was unable to remove completely the bitter principle by the methods they used, which consist in exhausting the seeds with absolute alcohol. It is probable that the samples of seeds they investigated were not as rich in the glucoside as the sample I investigated. In the assay of the seeds, I found it better that the extraction should be done, not by absolute alcohol, but by 65 per cent. alcohol in a long narrow percolator till the seeds were free from bitterness.

Working under the same conditions, I tried a series of experiments for exhausting the de-fatted seeds and examining both the tincture and the marc obtained, and arrived at the following conclusions:

1. Absolute alcohol is not a good solvent for the active principle present in the seeds.

2. The lower the percentage of alcohol, the more rapid is the removal of the active principle from the seeds.

3. A lower percentage of alcohol than 65 per cent., though it extracts the bitter principle more rapidly, yet it produces an unsightly tincture, which is not clear, and is very hard to filter.

4. Water alone is unsuitable, since the aqueous tincture decomposes very quickly; a precipitate was formed, and a bad odor developed within two days.

5. The best method to prepare a tincture, on the large scale, is to moisten the de-fatted seeds with alcohol 65 per cent. Then employ slow extraction (by 65 per cent. alcohol) in a long narrow percolator till the seeds are free from bitterness. A sample of the resulting tincture should be assayed both chemically and physiologically, and then the tincture diluted with 65 per cent. alcohol to an official strength.

This method of procedure is suggested since different samples of seeds—and hence the tinctures prepared from them—vary to a considerable extent in the strophanthin content.

These investigations were carried out in the pharmacological laboratories of the Manchester University, and I take this opportunity to express my best thanks to Professor R. B. Wild, M.D., M.Sc., F.R.C.P., and Mr. J. Grier, M.Sc., Ph.C., for their valuable suggestions and criticism.

TRITICUM REPENS: A COMMERCIAL RARITY.[1]

By James Small, D.Sc., Ph.C., F.L.S.

Some time ago Mr. E. M. Holmes informed me that there was a scarcity of genuine couch grass in commerce, and suggested that a microscopic investigation of the material being sold as *Triticum repens* would be of interest, the principal point being the identification of the botanical source of the commercial product. At his request I examined properly authenticated material of various species of grasses, and also a number of commercial samples. The result of this investigation is summarized in the title. *Triticum repens* is a commercial rarity, and the chief, if not the only, substitute is the rhizome of *Cynodon Dactylon,* the dog grass.

The method of examination was simple. Transverse sections of pieces from each authentic sample were prepared and double-stained with methylene blue and erythrosin. Similar unstained sections were prepared from the commercial samples, and a comparison was made. The rhizomes all have the usual scattered vascular bundles, with a few large vessels. They also agree in having a certain amount of sclerenchyma, and it is particularly by the amount and distribution of this tissue that the different species can be identified.

Description.

Triticum repens.—There are two rings of sclerenchyma, an outer ring, three or four cells wide, forming a hypodermis and a broader ring forming a common sheath to the vascular bundles, and at the same time completely enclosing the outer bundles (Fig. 1). A few small bundles occur in the cortex surrounded by a single row of sclerenchymatous cells. In mature rhizomes the pith shows some disintegration, and the center of the section is hollow.

Cynodon Dactylon.—Only one ring of sclerenchyma is present, forming a wavy band inside the narrow cortex and around the outer part of the rhizome. The cortex in this case is narrower than in *Triticum repens,* and it encloses no small vascular bundles. The scattered bundles within the ring of sclerenchyma have each a bundle sheath of the same tissue one or two cells wide. Dog grass rhizome

[1] Reprinted from *The Pharmaceutical Journal and Pharmacist,* July 26, 1919.

is usually oval in section, and at each end of the oval two lacunæ occur in the cortex. Within the sclerenchyma a large number of scattered vascular bundles occur. The most distinctive feature of this rhizome, however, is that all the cells of the ground tissue within

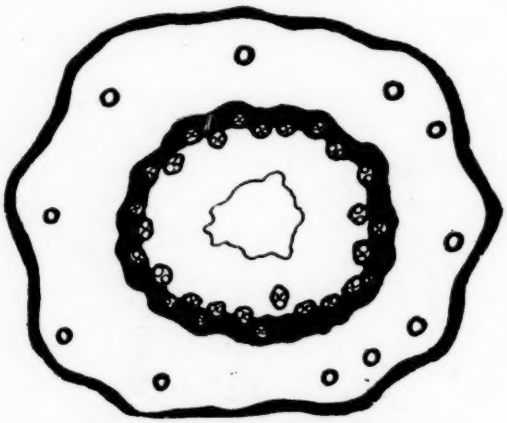

FIG. 1. *Triticum repens.*

the sclerenchyma have comparatively thick walls and are *filled with starch grains* (Fig. 2). Starch does not occur in any quantity in any of the other species examined. This starch gives a character-

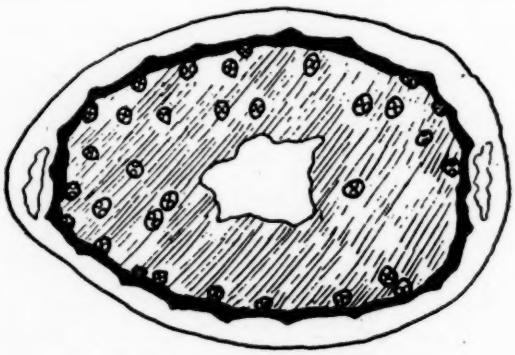

FIG. 2. *Cynodon Dactylon.*

istic white appearance to the cut surface of the rhizome. The center is frequently, but not always, hollow as in couch grass.

Commercial samples can be examined for this grass very easily. A clean, transverse cut with a sharp knife or a razor displays the

two lacunæ and the yellowish ring of sclerenchyma. A drop of tincture of iodine gives a black color with the white, starchy surface.

Holcus mollis.—The ring of sclerenchyma in this case is more or less hypodermal, like the outer ring in *Triticum repens.* It is at least twice as broad, and encloses some vascular bundles. Small islands of parenchyma occur at intervals below the epidermis, and rudimentary stomata are present outside such groups of cells (Fig. 3). Each of the scattered, central, vascular bundles has a

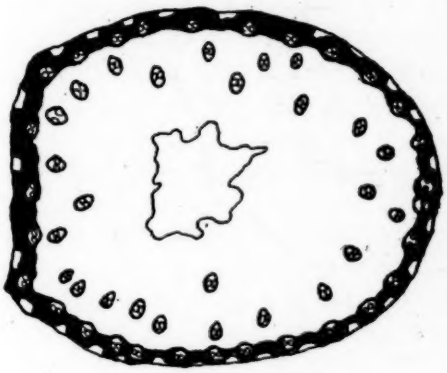

FIG. 3. *Holcus mollis.*

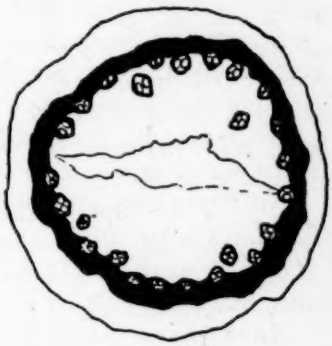

FIG. 4. *Agrostis vulgaris.*

sclerenchymatous sheath one or two cells wide. This species resembles dog grass in the oval shape of its section and in the hollow center, but it can readily be distinguished by the absence of starch and by the absence of any ring of ground tissue outside the sclerenchyma. Inosite or some other nutritive substance occurs in the outer part of the rhizome in the form of small, white grains, which do not stain blue with iodine. The cortex is three or four cells wide, as in *Cynodon,* and contains no small vascular bundles.

Agrostis vulgaris.—The ring of sclerenchyma forms a common sheath to the vascular bundles, like the inner ring of *Triticum repens.* This ring completely encloses the outer scattered bundles, and other bundles occur inside the ring, each with a sclerenchymatous sheath, one or two cells wide. The section may show no hollow center, or some disintegration may be present, giving a crack (Fig. 4) or a hollow center.

Examination of Samples.

No. 1 was part of an ordinary commercial sample in the Museum of the Pharmaceutical Society, and was found to consist of pure *Triticum repens.*

No. 2 was another museum specimen from the School of Pharmacy collection, and was genuine *Triticum repens.*

No. 3 was collected at a Kentish farm, and was genuine *Triticum repens.*

No. 4 was the only recent commercial sample which consisted entirely of *Triticum repens.* It is described as couch grass, "Glad."

No. 5 was a commercial sample obtained from a wholesale firm, and consisted of 75 per cent. *Triticum repens* with 25 per cent. *Cynodon Dactylon.*

No. 6 was dog grass, sold as couch grass, by a foreign herbalist. It was pure *Cynodon Dactylon.*

No. 7 was another sample of dog grass; and consisted entirely of *Cynodon Dactylon.*

Nos. 8, 9, 10, 11, 12, and 13 were samples from four wholesale firms, and were all pure *Cynodon Dactylon.*

No. 14 was a sample from one of the same firms, and contained a few fragments of an unidentified grass rhizome with no sclerenchyma, and with the cells full of starch. The great bulk of the sample was again *Cynodon Dactylon.*

No. 15, an old retail sample, was *Triticum repens.*

Discussion.

Triticum repens, or couch grass, is a common but rather variable grass occurring throughout Britain in cultivated ground and waste places, by the roadsides and on the seashore. It is regarded as a weed in pasture and arable land. It is dragged out of the fields and left at the edge for burning by the farmer or for collection by the herbalist.

Cynodon Dactylon, or dog grass, is very rare in Britain, occurring only on the South Coast of England. It is very common on the sea coast in the South of France and in Spain. It is regarded as the best pasture grass in India, where it is very abundant.

These were both known in commerce. It seemed possible, however, that some common British grass was being used, and *Holcus mollis,* or soft grass, a fairly common grass in woods and pastures

and by hedges, and *Agrostis vulgaris,* or bent grass, a very common grass on dry heaths and pastures and by roadsides were therefore examined. Neither of these grasses is a fodder plant. The former is a weed which is treated like couch grass by the farmer, and the latter is said to be disliked by cattle. Neither of these species was present in any of the samples.

The therapeutic value of *Triticum repens* is somewhat obscure, and the question arises whether *Cynodon Dactylon* may not have the same or a similar action. The solution of that problem is outside the scope of this investigation, which is a purely botanical inquiry into the source of the present supply of commercial couch grass. The botanical source is undoubtedly *Cynodon Dactylon,* and the history of the trade in drugs during the war suggests that Spain is the geographical source of the material. Zufall, in a recent article on couch grass, in the *Journal of American Pharmaceutical Association,* has also identified *Cynodon Dactylon* as the chief adulterant of and substitute for the U.S.P. Triticum.

Acknowledgments are due to Mr. E. M. Holmes for bringing the problem to my notice and for supplying a number of specimens; also to Professor H. G. Greenish for some of the samples.

SODIUM MORRHUATE IN TUBERCULOSIS.[1]

Reference was made last year (*Prescriber,* 1918, p. 149) to the introduction of a sodium salt of the fatty acids of cod-liver oil, known as sodium morrhuate, as a remedy for tuberculosis. Sir Leonard Rogers was led to think of this preparation by the success of intravenous injections of sodium gynocardate in leprosy. He now (*Brit. Med. Jour.,* 1919, I, 147: Feb. 8) gives a full report of the new product.

Sodium morrhuate is made from the unsaturated fatty acids of cod-liver oil after extraction by ether, by a process similar to that by which sodium gynocardate (see *Prescriber,* 1918, p. 123) is made from chaulmoogra oil. A 3 per cent. aqueous solution, sterilized, with the addition of 0.5 per cent. phenol, may be injected subcutaneously, with very little pain, and also intravenously. A year's experience has shown that such injections are of great value in leprosy, which proves that there is nothing specific in chaulmoogra oil, and

[1] Reprinted from *The Prescriber,* July, 1919.

supports Roger's view that these salts act in some way on the coating of the acid-fast bacilli. He is satisfied that sodium morrhuate is harmless.

The usual initial dose is 0.5 Cc. of the 3 per cent. solution, increased by 2 to 4 minims at each injection, which may be given two or three times a week until any reaction occurs; then a week's interval is left, and the dose reduced. Injections are given subcutaneously until they reach an inconvenient size, such as 2 Cc., when intravenous injections can be begun with 0.5 Cc. gradually increased in the same way.

Clinical trials of sodium morrhuate in phthisical cases have been made by E. Muir and others, and the results are distinctly encouraging. Rogers, in summing up these results, says that he is convinced of its harmlessness, which is more than can be said of tuberculin. "At the same time," he adds, "the fact that sodium morrhuate causes febrile and local reactions necessitates great caution in pushing the drug beyond the limits which have so far proved safe, and a warning is required regarding the possibility of harm being done by its injudicious use. With this caution I feel that the results already obtained justify me in bringing sodium morrhuate to the notice of the medical profession, to allow of the prolonged trials by many skilled workers, which will be necessary before its permanent value, if any, can be decided, and the indications and contraindications for its use worked out."

WESTERN AUSTRALIAN SANDALWOOD OIL.[1]

The January–March, 1919, issue of the *Bulletin of the Imperial Institute* contains an interesting article on the sandalwood of Western Australia, by Mr. C. E. Lane-Poole, conservator of forests in Western Australia, in which he criticizes a previous note in the *Bulletin* (January–March, vol. XV., No. 1) dealing with the production of sandalwood oil in Mysore, and in which reference is made to western Australian sandalwood, which Mr. Lane-Poole asserts hardly does justice to that product. The *Bulletin* stated that "so-called sandalwood exported from Australia" is mainly derived from *Fusanus spicatus,* but Mr. Lane-Poole cites botanical authorities such as Baron von Mueller, Dr. F. L. Stoward, and De Candolle,

[1] Reprinted from *The Chemist and Druggist,* September 6, 1919.

showing that the genus *Fusanus* approaches so closely the genus *Santalum* that, if finely drawn distinctions are waived, it may be regarded as identical with it and is merely a synonym as the Kew Index shows. Mr. Lane-Poole mentions that the western Australian sandalwood tree yields a sandalwood oil which is practically identical, chemically and pharmacologically, with that obtained from sandalwood from other sources of supply. Continuing he says that: "Discussion as to verbal differences in botanical classification of western Australian sandalwood reaches satisfactory finality when the oil obtained from the trees comes under notice. Many years ago, when sandalwood was fairly plentiful in those areas of western Australia now occupied almost exclusively by agriculturists, sandalwood oil was manufactured; but for various reasons the trade was never developed. Of recent years a start has again been made, and an oil produced which has found a ready sale. The santalol content of the western Australian oil varies from 75 to 80 per cent., but the oil has not yet been officially recognized by the British and American Pharmacopœias because there has hitherto been present in it a certain small percentage of sesquiterpene ethyl. Therapeutically, the presence of this foreign element has formed no bar to its success. The oil has been, and is, used in the Public Hospital at Perth and in other hospitals in Australia, and there is evidence that the sesquiterpene ethyl is as actively curative as the santalol in the oil. But its presence was held to place the oil below the standard demanded by the Pharmacopœias. The manufacturer here, having found ready sale for his product at fair prices, did not at the outset attach much importance to the foreign element in his oil. But the increased demand arising through the war induced him to make efforts to bring his product up to British Pharmacopœia requirements. With this view he submitted it to a chemist of repute in London, and has, within the last few months, learned that a process has been found which entirely eliminates the sesquiterpene ethyl, thus at once placing the western Australian product on a par with Mysore oil and meeting the B. P. standard. The figures given in the *Bulletin* note as to the value of the sandalwood exported from western Australia prove that the wood finds ready markets, but whether the whole of the export is used in perfumery, carving, and for ceremonial purposes, or is used in part for the production of 'Indian' oil, it is impossible to say. In view of the decision of the Mysore government to increase its output of sandalwood oil and in

the end, as it would appear, to establish a virtual monopoly in Mysore oil, a demand for western Australian sandalwood is likely to arise in Europe. Sandalwood is getting scarce in and near the settled districts of western Australia, but the extent to which it still exists is not accurately known. The present supplies are largely drawn from the eastern goldfields areas, but it is understood that sandalwood has been found in mid-continent in the neighborhood traversed by the Trans-Australian Railway. The extent of the growth there has yet to be ascertained." The question of the composition of the oil derived from West Indian sandalwood is now under investigation at the Imperial Institute.

CURRENT LITERATURE.

SCIENTIFIC AND TECHNICAL ABSTRACTS.

CYANOGENETIC GLUCOSIDES IN FERNS.—Greshoff has demonstrated the presence of a cyanogenetic glucosides in *Pteris aquilina* L., in *Gymnogramma aurea* Desv., and in species of *Lastræa* and *Athyrium*. Mirande has found a cyanogenetic glucoside in *Cystopteris alpina* Desv. It is present in all the green parts of the plants in fairly large quantity in the spring, but gradually diminishing as the season advances. (*L'Union Pharm.*, 59, 371, from *The Pharm. Jour. and Pharmacist*, May 31, 1919.)

ALKALOIDAL VALUATION OF EXTRACT OF BELLADONNA.—Differences having arisen regarding the alkaloidal value of extract of belladonna as determined by French and English analysts, it is desirable that a uniform method should be internationally adopted. The authors show that the process of the British Pharmacopœia (1898) involves losses due to incomplete removal of the alkaloids during the process of shaking out, to the numerous manipulations, and to the drying at 100°, by which a volatile alkaloid is driven off. Preference is given to the process of the French Pharmacopœia, which is simpler and determines the *total alkaloid*.—Goris and Beausite. (Bull. des Sciences Pharm., 26, 53, from *The Pharm. Jour. and Pharmacist*, May 31, 1919.)

MICRO-DETECTION OF LIGNEOUS ELEMENTS IN FLOURS AND PASTRY.—It is difficult to identify starch grains in cooked flours

and pastry, on account of the distortion of the starch by the action of the heat to which the articles have been exposed in cooking. In such cases the ligneous elements will often afford valuable evidence as to the nature of the starchy material originally used. The following method enables these elements to be isolated in a condition favorable for micro-examination. About 0.5 Gm. of the flour or pastry is well agitated with 10 mils of 10 per cent. nitric acid, and heated, first on the water-bath for five minutes, then for one minute directly in the flame. The heated mixture is centrifugated and the liquid decanted. The residue is boiled with 5 mils of 10 per cent. caustic soda solution, diluted with 5 to 10 mils of water. After again centrifugating the deposit is suitable for examination. If the pastry is rich in fat this should first be removed by means of suitable solvents, and the fat-free residue treated as above.—T. Fellenberg (*Mitt. geb. Lebensmitt u. Hygiene; Annales Chim. Analyt.,* 1919 (2), 1, 163, from *The Pharm. Jour. and Pharmacist,* May 31, 1919.)

Antineuritic Vitamin in Wheat and Corn Kernel.—According to Voegtlin and Myers the germ or embryo of the wheat and corn kernel contains all of the antineuritic vitamin of these cereals. Wheat flour or corn meal containing the germ is, therefore, more nutritious than the correspondingly highly milled products. Consideration of the distribution of the antineuritic substance in the wheat and corn kernel and in the animal body suggest that this accessory food is necessary for the metabolism of the growing plant as well as the animal body. It appears that cells with an especially active metabolism are also rich in antineuritic vitamin. (*Amer. Journal of Physiology,* from *Jour. Amer. Med. Asso.,* June 21, 1919.)

Estimation of the Nuclein Content of Yeast.—C. A. Lubsen (*Pharm. Week-blad.,* 1918, 55 (50), 1625–1628; through *J. Chem. Soc.,* 1919, 115, ii., 124).—In analyzing foodstuffs for nuclein content, pepsin-hydrochloric acid hydrolysis is employed (in which the nucleo-proteins are insoluble) to remove other proteins. The nucleins are then determined in the residue by estimating the phosphoric acid, which constitutes 4 to 7 per cent. of the nucleo-protein. The strength of the hydrochloric acid is of importance, for, if it be only 0.1 per cent., low results are obtained, but accurate results are yielded by 0.24 and even 0.35 per cent. acid, showing

that with acid of this strength the nucleins are not further hydrolyzed, as was suggested by some workers. H. F. E. H. (*The Analyst,* May, 1919).

Iodimetric Estimation of Acetone.—W. Marriott (*J. Biol. Chem.,* 1918, 16, 281; through *J. Pharm. Chim.,* 1919, 19, 133–136). —With reference to the method described by Shaffer and Marriot (*Analyst,* 1914, 39, 184) for the estimation of acetone and B-hydroxybutyric acid in urine, in which use is made of Messinger's method for the estimation of acetone, the following work was done to control the accuracy of that method: A sample of acetone regenerated from the bisulphite compound was purified by distillation with permanganate and then with calcium chloride. The product was then submitted to fractional distillation, and the fraction distilling at 56° to 75° C. collected. Very considerable care is required in making up and manipulating dilute aqueous solutions of acetone. The sample is weighed out in a small glass bulb of 2 to 3 Cc. capacity. The bulb is dropped into a 2-liter measuring flask and broken under water, the solution being then made up to the mark. Precautions are required to prevent loss of acetone in measuring off this dilute solution for analysis. The flask is closed by a rubber stopper with two holes, through one of which is passed a 25 Cc. pipette. The pipette is filled by means of a rubber ball, and the measured liquid is transferred to a flask containing 500 Cc. of water, the point of the pipette being dipped below the surface of the water. To this solution 50 Cc. of N/10 iodine and 10 Cc. of caustic soda solution at 60 Gms. per 100 Cc. are added. The flask is corked, shaken, and allowed to remain for five to ten minutes; 15 Cc. of hydrochloric acid are added, and the liberated iodine is titrated with N/10 thiosulphate. Each Cc. of N/10 iodine consumed is equivalent to 0.000968 Gm. of acetone. The results are quite sufficiently accurate: for instance, acetone taken 30.62 Mgrms., found 30.64 Mgrms.; taken 20.95, found 21.09 Mgrms. Geelmuyden has stated that small quantities of acetone cannot be distilled from aqueous liquids without appreciable loss; the author has proved that, with suitable precautions, acetone can be distilled and collected quantitatively in a few minutes. Five hundred Cc. of an aqueous solution containing 33.7 Mgrms. of acetone determined by the above method were placed in a Kjeldhal distillation flask of 800 Cc. capacity, with a tin

condenser terminating in a glass tube dipping below the surface of 50 Cc. of water placed in a receiver. Distillation was continued for thirty minutes, but it was ascertained, by titrations made at intervals, that the whole of the acetone had distilled over after ten minutes, the distillate then containing 33.6 Mgrms. of acetone by the Messinger method. The losses recorded by Geelmuyden did not occur, and it is suggested that that author did not have the end of the condenser dipping below the water in the receiver. (*The Analyst,* May, 1919.)

NEW URINARY REAGENTS.—The following reagent is said to furnish a very delicate test 1 : 1,000,000) for albumin. Added to urine it produces a white ring at the junction of the liquids (*Il Policlinico,* Mar., 1918):

Potassium bichromate	10 Gm.
Dilute sulphuric acid (25 per cent.)	100 Drops
Glacial acetic acid	100 Drops
Distilled water	100 Gm.

A copper-phosphate mixture is recommended by Folin and McEllroy (*Jour. Biol. Chem.,* 1918, 33, 513) as a reagent for sugar. They claim for the alkaline phosphates the advantages that they are cheaper, that they do not themselves reduce sugar, and that they tend to regulate the degree of alkalinity at a lower level of hydroxyl ion concentration than is obtained by carbonates alone. The mixture is as reliable as Benedict's reagent and rather more prompt. Its formula is as follows:

Sodium pyrophosphates	100 Gm.
Crystallized disodium phosphate	30 Gm.
Sodium carbonate	50 Gm.
Water	1 Liter
To this add:—	
Copper sulphate ($CuSO_4$, $5H_2O$)	13 Gm.
Water	200 C.c.

(From *The Prescriber,* September, 1919.)

OXIDATION OF APOMORPHINE.—It has already been shown that when morphine is digested with unsterilized food substances no apomorphine is produced, nor is such the case with ferments in the

presence of chloroform, toluol or sodium fluoride. Experiments with fungi and bacteria have shown that neither *Aspergillus* nor *Pencillium* splits up cocaine with formation of an oil with a basic reaction, probably pyrrol derivation; in no case, however, was benzoic acid produced; bacteria, on the other hand, readily do so. Neither fungus produces apomorphine from morphine. Apomorphine hydrochloride yields by oxidation with dilute solution of potassium ferricyanide a substance soluble in benzol with production of an intense amethyst-violet color; this is an exceedingly delicate test for apomorphine. By a rather lengthy process (details in the original), an oxidation product was obtained in absolutely black crystals soluble in chloroform with intense violet color similar to that produced when an apomorphine solution is carefully oxidized with potassium bichromate and shaken with chloroform. (E. Winterstem, *Schweiz. Apoth. Ztg.*, 57, 133. From *The Pharm. Jour. and Pharmacist*, July 5, 1919.)

Determination of Acids in Gastric Juice.—Binet and Verpy describe a technic which is based on Gaultier's simplification of Robin's modification of Töpfer's method. They commend the simplicity and the rapidity of the technic. It shows by three changes of tint in the one specimen of gastric juice in the single tube the content in the gastric juice of the hydrochloric acid, of the acids of fermentation, and of the total acidity. This is accomplished by adding a 0.548 per cent. solution of soda (137 Cc. of normal sodium hydroxid with water to 1 liter). The tube of 1.5 Cm. caliber is graduated in tenths of cubic centimeters to a height of 15 Cc. above the first mark, which represents a capacity of 5 Cc. Two other reagents are required: a 2 per cent. alcoholic solution of phenolphthalein, and Töpfer's reagent, which is a 0.5 per cent. alcoholic solution of dimethylamidoazobenzol. The filtered gastric juice is poured into the tube to the 5 Cc. mark; then one drop of the phenolphthalein solution and one drop of the Töpfer. If there is free hydrochloric acid present, the fluid turns a cherry red. Then with a dropper the titrated solution of soda is added, agitating at each drop, until the fluid turns the color of mandarin orange juice. This indicates saturation of the HCl and the figure marked on the tube represents the weight of free HCl in a liter of gastric juice. The soda solution is added further, drop by drop, until the tint veers to a distinct yellow. The figure representing the free HCl is then subtracted from the

figure reached now by the fluid, and the difference represents the acids of fermentation present. The soda solution is then added further, drop by drop, until the tint turns slightly pinkish. The mark then reached represents the total acidity. By subtracting from this figure the sum of the two other figures, we get the figure for the HCl in organic combinations. Comparative tests with this technic have confirmed its reliability, and it is in constant use in Leoper's service. (From *Jour. American Med. Assoc.*, Sept. 13, 1919.)

MEDICAL AND PHARMACEUTICAL NOTES.

Chloramine Paste.—A formula for chloramine paste is given by A. Carrel in his recent work, "The Treatment of Infected Wounds." It is as follows:

Chloramine-T	10
Stearate of soda	70
Water	1,000

The preparation of this substance is somewhat difficult, and it should be made by means of a mechanical mixer in order to obtain a thoroughly homogeneous paste. (From *The Prescriber*, August, 1919.)

Chloramine Ointment.—The following ointment is recommended by B. Deplas (*Presse médicale*) as a useful antiseptic application for superficial wounds:

Virgin wax	100	Gm.
Olive oil, sterilized	200	"
Balsam of Peru	3	"
Tincture of benzoin	3	"
Chloramine-T	4.5	"

Chloramine Surgical Powder:

Chloramine-T	1	Gm.
Zinc stearate	10	"
Sodium stearate	89	"

(From *The Prescriber*, August, 1919.)

Sugar Treatment of Tuberculosis.—In the last issue we printed several abstracts on the treatment of tuberculosis by means of sugar injections, a subject that is at present exciting lively interest in Continental practice. From there it has spread to America, where it is being given a thorough trial by several National Boards of Health. The treatment has been under trial by Prof. Le Monaco of Rome since 1907, and the following comment, which appears in a recent issue of *Riforma Medica* (Naples), is interesting: "The advantages of this new medication of the bronchi are truly notable, in addition to the fact that it avoids disturbing the gastro-intestinal functions, which is such a frequent drawback to the administration of drugs to act on the expectoration. The sugar treatment can be continued as long as desired, because it is harmless, to say nothing of the advantages of the sugar as a source for energy, developing a goodly number of calories in the intra-organic metabolism. In the tuberculous this method treatment is of preëminent importance, because even in the gravest cases it reduces the bronchial secretion, and thus diminishes the cough and the annoying night sweats. On the side of prophylaxis, this new remedy is destined to prove useful likewise, as, if the expectoration is diminished, there will not be so much sputum scattered about, and hence there will not be so much chance of contagion from this vehicle of infection, the most dangerous and the most certain of all." Further developments of this promising method will be awaited with interest. (From *The Prescriber,* July, 1919.)

Incompatibility of Mercuric Benzoate and Sodium Chloride.—Gaucher and other Continental physicians have prescribed mercuric benzoate dissolved in dilute sodium chloride solution for administration by hypodermic injection for the treatment of syphilis. At a recent meeting of the Academie de Médicine, E. Seger pointed out that such a combination was incompatible, and that mercuric chloride and sodium benzoate resulted from the double decomposition of these salts. M. Delépine fully confirms this. He prepared two solutions, one with mercuric benzoate and sodium chloride, according to Gaucher's formula; the other with equivalent quantities of mercuric chloride, sodium benzoate and sodium chloride. The ultimate composition of the two products was identical. On shaking out with ether, that solvent contained the same amount of mercuric chloride in each case. This proves that the original formula

of Gaucher is defective, and that nothing is gained by the use of mercuric benzoate, to immediately decompose it into mercuric chloride. If ammonium benzoate is used instead of sodium chlordie in the solution with mercuric benzoate and some ammonia, the result is different. A crystalline double salt is formed, which might possibly be of service therapeutically. Ultimately, however, even this compound is likely to be decomposed into mercuric chloride when it comes into contact with the sodium chloride present in the body. (M. Delépine, *Repertoire Pharm.*, 1919, 30, 184. From *The Pharm. Jour. and Pharmacist.*)